U.S. DEPARTMENT OF THE INTERIOR

FISH AND WILDLIFE SERVICE

FINAL ENVIRONMENTAL ASSESSMENT

for

The 2012 Hunt Plan for Patoka River National Wildlife Refuge and Management Area

Regional Director
U.S. Fish and Wildlife Service
5600 American Blvd West
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Abstract:

The United States Fish and Wildlife Service (Service) proposes to provide compatible hunting opportunities for migratory game bird, upland game, and big game species on units of the Patoka River National Wildlife Refuge & Management Area located within Pike and Gibson Counties in Southwest Indiana. This environmental assessment evaluates three possible alternatives for the hunting opportunities. The proposed action alternative will establish compatible hunting opportunities while providing non-hunting visitors with other priority public use opportunities (i.e. wildlife observation, wildlife photography, environmental education and interpretation) on lands described in the 2012 Hunt Plan and acquired thereafter. The approved acquisition boundary includes conservation easements, which will stay in private ownership and be managed by the U.S. Fish and Wildlife Service, and lands purchased in fee title. The proposed hunting opportunities will only involve both conservation easements and fee title land. The general broad objectives of the hunting program are:

-Provide the public with safe and enjoyable hunts that are compatible with the Refuge purpose.

-Provide quality hunting opportunities that minimize conflict with other public use activities.

-Provide the public with opportunities to hunt migratory game birds, upland game and big game species that are consistent with the states of Indiana, that don't adversely affect localized wildlife populations, and are consistent with the 1997 National Wildlife Refuge Improvement Act.

-Promote a better understanding and appreciation of Refuge habitats and their associated fish and wildlife resources.

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Contents

CHAPTER 1. PURPOSE AND NEED FOR ACTION

SECTION 1.1 Purpose

This Environmental Assessment (EA) is an update to the EA for Opening Portions of Patoka River National Wildlife Refuge and Management Area (Refuge) for Hunting and Fishing as Proposed in the 1996 Hunting and Fishing Plan. This EA is a step down plan of the Final Environmental Impact Statement for the establishment of the Patoka River National Wetlands Project (EIS) which was used to fulfill NEPA compliance to open the Patoka River National Wildlife Refuge and Management Area National to hunting.

The Purpose of this Environmental Assessment is to evaluate alternatives for opening and administering a hunting program on the fee title and easement lands described in the 2012 Hunt Plan.

SECTION 1.2 Need

Providing compatible wildlife-dependent recreation and education activities on units of the National Wildlife Refuge System is a Service priority. The National Wildlife Refuge System Administration Act of 1966 (Act) as amended by the National Wildlife Refuge System Improvement Act of 1997 (16 U.S.C. 668dd et seq.) provides authority for the Service to manage the Refuge and its wildlife populations. In addition, it declares that compatible wildlife-dependent public uses are legitimate and appropriate uses of the Refuge System that are to receive priority consideration in planning and management. There are six wildlife-dependent public uses: hunting, fishing, wildlife observation, wildlife photography, environmental education and interpretation. The Act directs managers to facilitate recreational opportunities, including hunting, on National Wildlife Refuges when compatible with the purposes for which the Refuge was established and the mission of the National Wildlife Refuge System.

Hunting on Patoka River National Wildlife Refuge and Management Area will allow Refuge staff to manage wildlife populations at acceptable levels, provide wildlife-dependent recreational opportunities for the public, and promote a better understanding and appreciation of bottomland hardwood forest habitats and their associated fish and wildlife resources. Implementation of the proposed actions will be consistent and compatible with the Refuge Recreation Act, Refuge Administration Act, and the EIS for the establishment of the Patoka River National Wetlands Project.

SECTION 1.3 Decisions That Need To Be Made

This EA is prepared to evaluate the environmental consequences of opening newly acquired fee title and easement lands of the Refuge to hunting and the types of hunting that will be allowed. Three alternatives are presented in this document:

A. Keep all lands described in the 2012 Hunt Plan and all lands added as addendums to the Hunt Plan in the future closed to all hunting (No Action Alternative)

B. Allow the hunting of migratory game birds, upland game, and big game species on most of the fee title lands and conservation easements described in the 2012 Hunt Plan and most lands added as addendums to the Hunt Plan in the future in accordance with federal regulations, Refuge-specific regulations, and the laws of the State of Indiana. (Preferred Alternative).

C. Allow the hunting of migratory game birds, upland game, and big game species on all fee title lands and conservation easements described in the 2012 Hunt Plan and all lands added as addendums to the Hunt Plan in the future in accordance with federal regulations, Refuge-specific regulations, and the laws of the State of Indiana.

The Regional Director, U. S. Fish and Wildlife Service, Twin Cities, Minnesota, is the official responsible for determining the action to be taken in the proposal by choosing an alternative. The Regional Director will also determine whether this Environmental Assessment (EA) is adequate to support a Finding of No Significant Impact (FONSI) decision, or whether there is a significant impact on the quality of the human environment, thus requiring the preparation of an Environmental Impact Statement (EIS).

SECTION 1.4 Background

The Patoka River National Wetlands Project encompasses 22, 472 acres in Gibson and Pike counties in southwestern Indiana (see Figure 1). Lands purchased as conservation easements or in fee title are administered by the US Fish and Wildlife Service (Service) and become units of the Patoka River National Wildlife Refuge and Management Area (Refuge) under the authority of the Fish and Wildlife Act of 1956 "… for the development, advancement, management, conservation, and protection of fish and wildlife resources…" [16 U.S.C. 742f(a)(4)] "…for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude…" [16 U.S.C. 742f(b)(1).]

Patoka River NWR & MA was established in 1994. It was created under authority of the Emergency Wetlands Resources Act in part to protect one of two remaining intact floodplain forest systems within Indiana. The authorized boundary, which delineates where the Service can acquire property from willing sellers, encompasses 22,472 acres of wetlands, floodplain forest, grasslands, shrublands, and upland forest along 20 miles of the Patoka River corridor. Management objectives are identical for the National Wildlife Refuge (NWR), authorized at 7,005.5 acres, and the Management Area (MA), authorized for the remaining 15,466.5 acres. The separate designations avoid legal conflicts with the Surface Mining Control and Reclamation Act (SMCRA) of 1977. It has no implications for the management of these areas.

The staff of Patoka River NWR & MA administers three units in addition to the main body of the Refuge. The Cane Ridge Wildlife Management Area (488 acres, fee title, closed to all public

access except non-consumptive uses in designated areas), White River Bottoms Unit (219 acres, fee title), and Columbia Mine (1,043 acres, conservation easement) are all considered part of the National Wildlife Refuge.

The Refuge provides hunting opportunities for game species such as: waterfowl, cottontail rabbit, gray and fox squirrel, mourning dove, white-tailed deer, and wild turkey.

The purposes for which the Refuge was established, as contained in the EIS and approved in the Record of Decision in 1994, include:

1. To restore, protect, and manage a bottomland hardwood forest for the many values associated with wetlands

2. To restore, protect, and manage uplands that compliment and/or protect wetlands

3. To restore, protect, and manage migratory bird habitat

4. To restore, protect, and manage habitat for endangered and threatened species of plants and animals

5. To increase public opportunities for outdoor recreation and environmental education

6. To provide wildlife extension services and restore habitat in southwestern Indiana according to guidelines of the Service's Partners for Fish and Wildlife Program

7. To improve water quality in the Patoka River watershed to reduce adverse impacts on human health and wildlife productivity, enhance the fishery resource, and increase the attractiveness of the water resources for wildlife-oriented public recreation

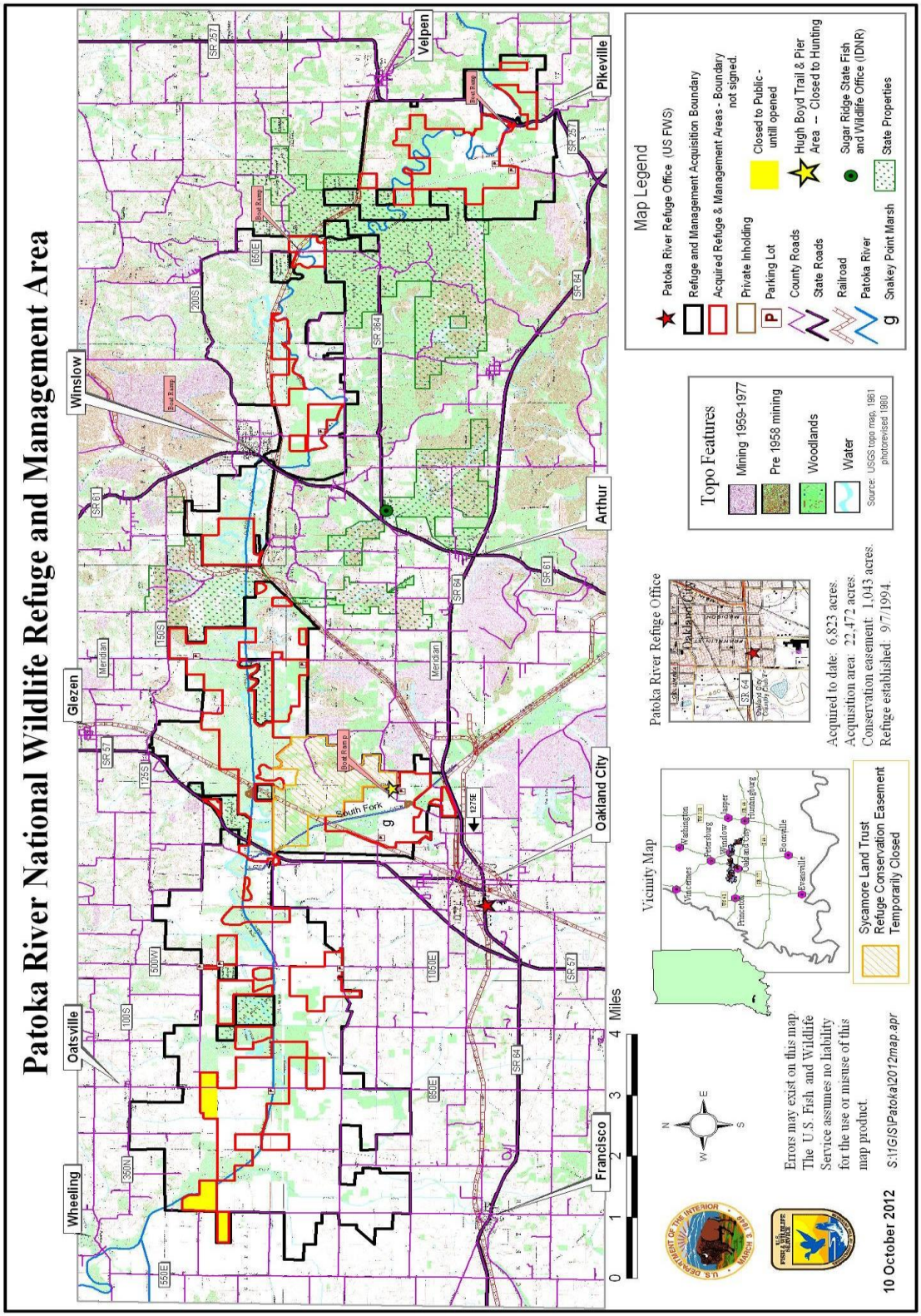

Figure 1. Patoka River National Wildlife Refuge and Management Area, Southwestern Indiana

Specific objectives of the hunting program include:

1. Provide the public with safe and enjoyable hunts that are compatible with the Refuge purpose.

2. Provide quality hunting opportunities that minimize conflict with other public use activities.

3. Provide the public with opportunities to hunt migratory game birds, upland game and big game species that are consistent with the state of Indiana, that don't adversely affect localized wildlife populations, and are consistent with the 1997 National Wildlife Refuge Improvement Act.

4. Promote a better understanding and appreciation of Refuge habitats and their associated fish and wildlife resources.

CHAPTER 2. PROPOSED ACTION AND THE ALTERNATIVES

SECTION 2.1 Alternatives Eliminated From Detailed Study

No alternative was eliminated from detailed study.

SECTION 2.2 Alternatives Carried Forward for Detailed Analysis

This Environmental Assessment is prepared to evaluate the environmental consequences of opening fee title and conservation easement lands within the Refuge to hunting and the methods of hunting on the Refuge. Three alternatives are presented in this document:

2.2.1 Alternative A: Keep all lands described in the 2012 Hunt Plan and all lands added as addendums to the Hunt Plan in the future closed to all hunting (No Action Alternative)

Under this alternative, the Refuge units would continue to serve as habitat for wildlife and provide for five of the compatible wildlife dependent public uses – fishing, wildlife observation, photography, environmental education, and interpretation. Some populations, such as white-tailed deer and Canada geese, would continue to grow and possibly increase to levels that result in damage to agricultural croplands as well as to native vegetation without the population control provided by hunting. The potential for depredation complaints from local landowners and farmers would increase. Under this alternative, the public would also not be able to participate in one of the compatible wildlife-dependent public uses.

Under the No Action alternative, the Service would continue to purchase conservation easements and fee title properties. Planning for and implementing habitat restoration activities would continue to enhance these areas. It would also manage existing habitats for wildlife. These actions would be carried out in cooperation with volunteers and partners.

2.2.2 Alternative B: Allow the hunting of migratory game birds, upland game, and big game species on most of the fee title lands and conservation easements described in the 2012 Hunt Plan and most lands added as addendums to the Hunt Plan in the future in accordance with federal regulations, Refuge-specific regulations, and the laws of the State of Indiana. (Preferred Alternative).

This alternative would allow hunting on most fee title and conservation easement lands within the Refuge in accordance with federal regulations, Refuge specific regulations, and the seasons and regulations set by the State of Indiana, after the following determinations are made for each unit:

1) The unit is large enough to support the anticipated quantity, frequency, and duration of hunting use;

2) Public access to the unit does not require travel across private lands or closed government lands;

3) Sites are available for hunting users to park their vehicles legally and in a manner that will not adversely affect the habitat in the unit or existing public travel routes;

4) Public hunting will not have adverse effects on any federally listed or proposed species of concern; and

5) Hunting can be conducted without jeopardizing public safety.

The Refuge Manager may establish specific regulations for an individual unit to ensure the above requirements are met. Certain units or portions of units may remain closed or be periodically closed to hunting if the Refuge Manager determines that there are specific habitat, wildlife protection, and/or public safety needs that require establishing sanctuary areas. Hunting would be conducted in accordance with all applicable state, Refuge, and federal regulations. Coordination with Indiana DNR biologists will promote continuity and understanding of Service and state resource goals and objectives, and will help assure that the decision-making process takes into account all interests.

2.2.3 Alternative C: Allow the hunting of migratory game birds, upland game, and big game species on all fee title lands and conservation easements described in the 2012 Hunt Plan and all lands added as addendums to the Hunt Plan in the future in accordance with federal regulations, Refuge-specific regulations, and the laws of the State of Indiana.

This alternative would allow hunting on all fee title and conservation easement lands within the Refuge in accordance with the federal regulations, Refuge-specific regulations, and the laws of the State of Indiana. Considerations would not be made on a tract by tract or unit by unit basis. On-site managers would not be able to deviate from the established guidelines. Hunting would be conducted in accordance with all applicable state and federal regulations. Coordination with

Indiana DNR biologists will promote continuity and understanding of Service and state resource goals and objectives, and will help assure that the decision-making process takes into account all interests.

SECTION 2.3 Alternatives Action Table

Table 1 below summarizes the actions that are anticipated under each alternative. Detailed discussion of the environmental impacts of each alternative can be found in Section 4. Some of the issues carried into the impact assessment are described in more detail in Section 4.

Table 1: Alternative Action Table

Action	Alternative A (No Action Alternative) No Hunting on Refuge Units	Alternative B (Preferred Alternative) Allow Hunting on Most Refuge Units	Alternative C Allow Hunting on All Refuge Units
Species that will be hunted	None	Ducks, geese, coots, sora, snipe, woodcock, mourning dove, bobwhite quail, wild turkey, cottontail rabbit, squirrel, fox, coyote, white-tailed deer	Ducks, geese, coots, sora, snipe, woodcock, mourning dove, bobwhite quail, wild turkey, cottontail rabbit, squirrel, fox, coyote, white-tailed deer
Compatible with Refuge Goals and Purpose	Yes. Provides for priority non-consumptive public uses	Yes. Provides for priority public uses and maintain healthy wildlife populations to benefit the Refuge ecosystem	Yes. Provides for priority public uses and maintain healthy wildlife populations to benefit the Refuge ecosystem
Provides for Priority Public Uses	No. Does not provide for hunting opportunities	Yes. Provides for hunting opportunities	Yes. Provides for hunting opportunities
Hunting and non-hunting activities segregated	Yes. Does not allow hunting and therefore no conflict exists with non-hunting activities	No. Doesn't separate uses, conflicts possible, but deemed minimal, if conflicts exist, Refuge Manager would be able to close an area or unit to alleviate conflicts	No. Doesn’t separate uses, conflicts possible, but deemed minimal
Meets needs identified by public and partners	No. Does not maximize hunting opportunities as identified by most public and partners	Yes. Maximizes hunting opportunities as identified by most public and partners	Yes. Maximizes hunting opportunities as identified by most public and partners

CHAPTER 3. AFFECTED ENVIRONMENT

SECTION 3.1 Physical Characteristics

The Patoka River NWR & MA is located within the Ohio River Valley Ecosystem (ORVE). This ecosystem drains a total area of approximately 141,000 square miles and includes portions of 10 states.

The rich flora and fauna of the ORVE reflect its diverse physiography and unique geologic past. Numerous trust species occur in the ecosystem, including many federally listed threatened or endangered plants, mussels, fishes, birds and mammals. The unusually rich and diverse fauna found in the ecosystem is the product of a multitude of biotic and abiotic factors which have evolved over time. Throughout geologic time, changes in such factors as topography, climate, and geomorphology have formed, modified, and eliminated habitats and consequently have had a profound effect upon the distribution of the faunal assemblages in the ecosystem. Due to the ecosystem's central geographical location in the eastern United States, some species with northern affinities and others with southern affinities occur in the ecosystem in addition to those common to the central region of the country.

Over the past few centuries of Euro-American settlement and industrialization, the Ohio River Valley ecosystem has been subjected to many environmental stresses which have diminished the bounty of its living resources. Much of the region's economic activity – agriculture, lumbering, mining, energy production, manufacturing, and recreation – is based on the watershed's natural resources. Sustaining most of these activities requires maintenance of a healthy ecosystem.

Historically, the Refuge was a part of the expansive, contiguous hardwood forest that covered most of the southwest Indiana. The Refuge strives to maintain a diverse mosaic of natural vegetation to benefit a diversity of wildlife and plants.

SECTION 3.2 Biological Environment

3.2.1 Habitat

Flowing 162 miles through four counties in southwestern Indiana, the Patoka River represents a classic meandering midwestern stream. The Patoka River floodplain contains some of the finest examples of bottomland forested wetland remaining in the state. Although somewhat degraded by past drainage and land development efforts, the array of wetlands, forests, grasslands and other habitat types found within the Refuge boundary continue to support a rich diversity of fish and wildlife species.

Forests

Bottomland Hardwood Forests

Wetland management at Patoka River NWR & MA consists primarily of restoring bottomland forests. There are nearly 13,000 acres of existing bottomland hardwood forests or sites that could be restored to bottomland hardwoods within the refuge acquisition boundary. With the aim of maximizing forest species diversity, the refuge plants 500 tree seedlings per acre on newly acquired sites (i.e. bottomland agricultural fields) where the objective is to restore a forested corridor along the Patoka River.

Ultimately, over the long term (100 years) the bottomland hardwood forests will be managed to maintain a mosaic of age and structural classes. Lower elevations are dominated by black willow, sweetgum, silver maple, and river birch. Pin oak, Shumard oak, swamp chestnut oak, swamp white oak, red maple, green ash, sycamore, and cottonwood dominate the mid-elevations, while upper elevations are typically comprised of cherrybark oak, hickory, and pecan.

Upland Forests

The total acreage of the upland forest within the refuge's acquisition boundary is 2,704 acres. Over the long term (100 years), the Refuge will maintain a mosaic of hardwood stands of different age and structural classes distributed on upland areas. These forests are dominated by white oaks, black oaks, hickory, and blackgum on drier sites, and by red oaks, yellow poplar, beech, sugar maple, walnut, hickory, and cherry on wetter sites.

Wetlands

Emergent Wetlands

The total acreage of emergent wetlands in the acquisition boundary is 775 acres. The current objective is to maintain presently owned emergent wetlands (approximately 500 acres) in a mixture of vegetation such as cattail, bulrush, sedges, spatterdock, water lily and smartweeds.

Lakes and Ponds

The total acreage of lakes and ponds within the refuge's acquisition boundary is 885 acres.

Patoka River, Oxbows, and Patoka Tributaries

The total acreage of the Patoka River, its oxbows and tributaries within the refuge acquisition boundary is 534 acres.

Water Quality

The Refuge's current objective is to improve water quality within the Patoka River and its tributaries to move towards compliance with Indiana Department of Environmental Management standards. The long-term goal is removal of the streams from the list of impaired waters.

Moist Soil Units and Scrapes

The Refuge currently manages over 300 acres of moist soil units. Moist soil units include (mostly) passively managed scrapes and actively managed moist soil units.

The Refuge has restored small wetland scrapes covering approximately 30 acres. Some of these small wetlands have water control structures. Water is stored in shallow pools to encourage waterfowl, shorebird and marsh/waterbird use. Some wetlands are referred to as macrotopography wetlands which are shallow scrapes ranging from three inches to two feet deep and depend on flooding and/or rain events for their water supply. Bottomland hardwood trees have been planted all around these wetlands. They are set up for passive management to resemble old river oxbows.

Cane Ridge has four moist soil units that total 193 acres. These are managed to achieve shallow fall flooding, and are slowly drained in the spring. They are intended to benefit waterfowl and shorebirds and are allowed to vegetate and grow in the summer with moist soil plants. The four units can be managed independently enabling staff to maximize diversity.

At Dillin Bottoms, Ducks Unlimited designed and supervised construction of two moist soil units covering 62 acres. These units are designed to be flooded by reverse flow flap gates during high water or with a permanent station auger pump operated by a portable diesel engine and PTO shaft.

Over the medium term future, the Refuge will maintain existing moist soil areas and convert up to a total of 700 acres of bottomland farmland to moist soil management that provides a diversity of native herbaceous plant foods such as wild millet (Echinochloa spp.), panic grass (Panicum spp.), sedges (Cyperus spp. and Carex spp.), and beggarticks (Bidens spp.).

Grasslands/Shrublands

The Refuge has around 1100 acres of grassland/shrubland within the acquisition boundary. Grassland types include reclaimed coal-mined land, restored prairie, and old field habitat. Reclaimed surface-mined land typically has been planted with non-native plants like sericea lespedeza and fescue to hold the soil in place and left to grow up in brush. Where conditions are appropriate, the refuge has restored native grasses and forbs on reclaimed mine land as well as agricultural fields. Very few fields have been allowed to naturally revegetate because of the threat of takeover by non-native plants present in the seedbank.

The 1,043 acres Columbia Mine, managed by the Refuge under a conservation easement, is comprised of nearly 700 acres of grassland and shrubland.

Cropland

Within the acquisition boundary lies about 4,500 acres of bottomland farmland. For the most part, land acquired as cropland is being maintained as such until funds are secured to convert the land to moist soil units or bottomland forests. The Refuge will choose to keep certain areas open, and not restored to moist soil units or forests, through farming to ensure attractive habitat is provided for shorebirds, wading birds, and waterfowl. Continued farming is done in a partnership with the original farmer or a tenant farmer through an annual cooperative farming agreement. The refuge claims a quarter-share of the crop to be planted for wildlife and directs the farmer where to plant the refuge's share.

3.2.2 Wildlife

The diverse habitats found within the Patoka River watershed support equally diverse wildlife populations, with more than 380 species of mammals, birds, reptiles, amphibians, fishes and mollusks known or expected to occur on the Refuge.

Birds

The Patoka River and surrounding wetland and upland areas provide an array of habitat types which fulfill the necessary breeding, feeding, migration and wintering requirements for a variety of avian species. Scientific surveys, organized bird counts and casual observations have recorded over 230 species of waterfowl, wading and shore birds, songbirds, game birds and others within the Refuge.

Mammals

Indiana is home to 54 species of mammals, of which 41 species occur on the Patoka River NWR & MA. These include an array of game, non-game and furbearing mammals.

Amphibians and Reptiles

The Patoka River valley is within the range of at least 60 species of herptiles, that is, snakes, turtles, lizards, skinks, salamanders, newts, sirens, toads and frogs (Conant, 1958). A diverse assortment of reptiles and amphibians occur on the Refuge and fill many important niches in the ecosystem's natural food chain. Because the majority of these species require moist woodlands, ponds, streams, marshes, swamps or quiet backwaters, Patoka River NWR & MA provides excellent herptilian habitat.

A comprehensive herpetofauna survey was conducted on the Refuge from February 2009 to October 2010. From a possible 62 species with ranges within the Refuge boundaries, 42 species were found and documented, including 17 new county records.

Insects

The exact number of insect species found in the Refuge is not known.

A comprehensive survey of dragonflies and damselflies (Odonata) was conducted in 2009. A total of 30 dragonfly species and 13 damselfly species were identified on the Refuge, including 13 species considered rare or imperiled for the state of Indiana (Batema and Landowski 2010).

Molluscs

Historically, the Patoka River supported a rich diversity of freshwater mussels that were utilized by Native Americans and wildlife alike. A survey of freshwater mussels conducted in 2000 along the entire length of the Patoka River and portions of its tributaries found 28 mussel species (Ecological Specialists, Inc. 2001). This is fewer than the 33 species reported in historic records. The segment of the Patoka River flowing through the Refuge contained 17 mussel species. No species were found in the channelized portion of the river probably because the habitat in this stretch has been altered so as to render it unsuitable.

Fish

Most of the Refuge's fishery resources are associated with the Patoka River and its wetlands. Two fisheries surveys of the Patoka River and many of its tributaries in the late 1980s and early 1990s revealed that fish populations were surprisingly diverse and abundant, especially considering the environmental abuses this river has endured over the past 70 years (Stefanavage, 1993; U.S. Fish and Wildlife Service, 1989). A total of 66 species of fish representing 15 families were found to inhabit these waters. Although not usually considered prime fish habitat, overall species diversity in the Patoka River in 1991 compared favorably with other southwest Indiana streams (Stefanavage, 1993).

Considering the Patoka River's low dissolved oxygen levels, muddy brown/green water, and limited in-stream structure (habitat), it is not surprising that common carp was found to be the most abundant species. Gizzard shad, an important food source for more desirable predatory fish, was the second most abundant. Third in number was smallmouth buffalo, an edible species frequently sought by anglers. Of the more popular game fish, channel and flathead catfish probably provide the best sport fishing opportunities in this section of the river. Largemouth bass, bluegill and crappie, while present, do not have populations large enough, or do not grow at a sufficient rate, to offer substantial fishing opportunities.

3.2.3 Threatened, Endangered and Candidate Species

Federally listed Threatened and Endangered Species that occur within the boundaries of the Refuge include the Indiana bat (*Myotis sodalist),* least tern (interior population) (*Sterna antillarum),* and whooping crane (Grus Americana).

In 2001, the U.S. Fish and Wildlife Service initiated a reintroduction of a Nonessential Experimental Population of whooping cranes in the Eastern United States. The intent was to establish a migratory flock that would summer and breed in Wisconsin and winter in west-central Florida which was historical habitat. Since the migration route is a learned rather than an innate behavior, captive-reared Whooping Cranes released in Wisconsin were led by ultralight aircraft

to establish their historical flight path to suitable wintering areas in Florida. Annual stop overs on the Refuge have been documented in the spring, fall, and winter since 2001 during migration.

The Indiana bat was listed as federally endangered in 1967 under the Endangered Species Conservation Act, a precursor to the Endangered Species Act of 1973. Primarily the bats declined in number because of loss or disturbance of caves or other hibernacula. The bats hibernate communally in large numbers. Disruption or destruction of a single site can dramatically affect the population. It occurs in several locations across Indiana. A maternity colony containing more than 100 adults in a large dead tree was first documented on the Refuge in 2005.

The historic breeding range of the federally listed endangered Least Tern extended from Texas to Montana and from eastern Colorado and New Mexico to southern Indiana. It included large rivers of the Red, Missouri, Arkansas, Mississippi, Ohio, and Rio Grande River systems. It nests on sand and gravel bars and protected beach areas of large rivers, and winters in coastal Central and South America. The species is endangered because human disturbance and alteration of river systems have rendered much of its nesting habitat unusable.

The 488-acre Cane Ridge Wildlife Management Area lies 24 miles west of the Refuge headquarters includes 193 acres of moist soil wetlands in four management units, 180 acres of reforested bottomland hardwoods, and a 59-acre deep water impoundment with nesting islands that provide habitat for the Least Tern. The terns have used the nesting islands for that purpose fledging an average of 40 young per year since 2005.

SECTION 3.3 Land Use

Within the 22, 472 acre Refuge acquisition boundary there are approximately 15,700 acres of bottomlands and 6,700 acres of uplands, as determined by soil type. Within the bottomlands, over 9,000 acres are bottomland hardwood forest and associated wetlands, with the majority of the remaining 6,600 acres in farmland. The uplands are characterized by over 3,200 acres of farmland, 2,700 acres of forest, and the remaining acreage in other various cover types.

Farming is the main use within the Refuge boundary (approximately 12,000 acres), with corn, soybeans, and wheat being the primary cash crops.

SECTION 3.4 Historical Properties and Cultural Resources

There are no known historical properties and cultural resources on the Refuge.

SECTION 3.5 Local Socio-Economic Conditions

The Refuge is located in Pike and Gibson Counties, Indiana, and is in close proximity to Daviess, Dubois, Knox, Spencer, and Warrick Counties. Compared to the State of Indiana as a whole this seven-county area has a smaller population growth rate and is less racially and ethnically diverse. On average, the area's population has a lower median income, and less high

school and college education than the state's population.

Population
The total population of the seven counties was 226,861 in the 2000 Census (USCB, 2006). The seven-county population was 97.3 percent white in 2000; the State population was 87.5 percent white.

Employment
In 2000 there were a total of 21,744 full- and part-time jobs in Pike and Gibson counties. Farm/forestry/fishing employment accounted for about five percent of the jobs across the area. The manufacturing and education/health/social services industries were and are the largest economic and employment sectors in these counties (USCB, 2000a; USCB, 2000b).

Income and Education
Average per-capita income in the seven-county area was $18,619 in 1999; in Indiana it was $20,397. The median household income in the seven-county area was $40,057 in 1999; in the state it was $41,567 (USCB, 2006).

In the seven-county area, 14.8 percent of persons over 25 years of age hold a bachelor's degree or higher. The comparable figure in the state is 19.4 percent. This discrepancy is typical of the difference between largely rural areas like these seven counties and entire state populations which include large numbers of more urban residents who are professionals and have higher educational attainment on average (USCB, 2006).

CHAPTER 4. ENVIRONMENTAL CONSEQUENCES

This chapter describes the foreseeable environmental consequences of implementing the three management alternatives in Chapter 2. When detailed information is available, a scientific and analytic comparison between alternatives and their anticipated consequences is presented, which is described as "impacts" or "effects." When detailed information is not available, those comparisons are based on the professional judgment and experience of Refuge staff and Service and State biologists.

SECTION 4.1 Alternative A: No Action Alternative -All lands within the Patoka River 2012 Hunt Plan and all lands added as addendums to the Hunt Plan in the future are Closed to Hunting

Without a hunting program, the Refuge would essentially represent a sanctuary unavailable to the public for the harvest of wildlife resources. This would make it impossible for the Refuge to fully meet one of its priority objectives, increasing public opportunities for outdoor recreation and environmental education, and would be contrary to the President's recent Executive Order (Management and General Public Use of the National Wildlife Refuge System) directing the Service to provide expanded opportunities on Refuges for compatible wildlife-dependent

recreational activities, including hunting. Maintaining the entire Refuge as a sanctuary could encourage land acquisition within the Refuge boundary by private parties lured by the prospects of enhanced hunting opportunities (private land located within a wildlife sanctuary). The result could impede the Service's acquisition program, thereby reducing the potential to fully realize the purposes for which the Refuge was established.

4.1.1 Habitat Impacts
No additional public use impacts on vegetation are expected with this alternative.

4.1.2 Biological Impacts
Potential damage to agricultural croplands, as well as to native vegetation, including tree plantings for forest restoration, may occur without herbivore population control provided by hunting.

4.1.3 Listed Species
No effect is expected for any of the threatened and endangered species found within the boundaries of the Refuge as a result of this alternative.

4.1.4 Historic Properties and Cultural Resources
There are no historical properties documented on current Refuge lands. Hunting is not expected to cause ground disturbance or disturbance to standing structures and will have no effect on any historic properties located on lands acquired in the future.

4.1.5 Cumulative Impact Analysis of the No Action Alternative

4.1.5.A Anticipated Direct and Indirect Impact on Wildlife Species
This alternative would have little to no effect on most wildlife populations with the possible exception of white-tail deer. Deer populations would increase on those tracts that are large enough to support a local population. It allows more deer the potential to grow older, increasing the percent of mature bucks, popular with non-hunting visitors. Disturbance to Refuge wildlife would continue as is presently caused by non-consumptive users.

This alternative could allow deer populations to become too large for an individual unit which in turn would create a situation of the over browsing of vegetation. This can cause degradation of the plant community and reduction of food available for the population. This would have negative impacts on other resident and non-resident wildlife populations whose life requirements include diverse vegetative communities.

4.1.5.B Anticipated Direct and Indirect Impact on Refuge Programs, Facilities, and Cultural Resources

<u>Other Refuge Wildlife-Dependent Recreation</u>
Approximately 23,500 visitors used the Refuge units in 2012. Many of these visits were for hunting (10,450 visits) in accordance with the 1996 Refuge Hunt Plan and EA. Non-

consumptive visits totaled approximately 7,940.

Under this alternative, the public would not have the opportunity to participate in hunting in land described in the 2012 Hunt Plan and lands added in the future, which is one of the priority public uses, and compatible with the purposes for which the Refuge was established. Hunting is also a way for the public to gain an increased awareness of Patoka River NWR and the National Wildlife Refuge System. By not allowing hunting, the Service would not be meeting a public use demand and public relations would not be enhanced with the local community.

Refuge Facilities

No additional impacts to Refuge facilities (roads, parking lots, trails) will occur with this alternative. Under this alternative, approximately 7,000 acres would be open to hunting (those approved through the 1996 Hunt Plan and EA), while lands in the 2012 Hunt Plan and beyond would be closed to hunting, and wouldn't experience potential impacts to facilities by hunters.

Maintenance or improvement of existing roads and parking areas will cause minimal short term impacts to localized soils and may cause some temporary wildlife disturbance.

Cultural Resources

This alternative will not have any additional impacts to cultural resources.

4.1.5.C Anticipated Direct and Indirect Impact on Refuge Environment and Community

The No Action alternative will have little if any impact on soils, air quality, water quality or solitude. Vegetation, as stated above, could be affected if the deer population increases to a level to cause degradation of plant communities.

This alternative may have impacts on hunting opportunities in the local area. Over the last 15 years it has become increasingly difficult for hunters to acquire access to hunt on private land throughout southwest Indiana. More and more landowners are either leasing their land for an entire season, charging hunters a daily fee, or selling their land for recreation use. This change in land use has increased the importance of public land to hunters. Not opening these units to hunting will result in the continued decrease of lands open to hunting for many hunters. This will be exacerbated as additional lands are added to the Refuge.

However, this alternative could possibly make the private land adjacent to these units more valuable. The landowner will have a wildlife sanctuary adjacent to their land which could conceivably make their property more valuable for leasing or to sell.

4.1.5.D Other Past, Present, Proposed, and Reasonably Foreseeable Hunts and Anticipated Impacts

Hunting was allowed on most of these lands when they were in private ownership before they became part of the Refuge. These hunts were all done within the state regulations and seasons. This alternative would not allow hunting and therefore there would be no anticipated impacts from this alternative.

4.1.5.E Anticipated Impacts If Individual Hunts are Allowed to Accumulate

This alternative would not allow hunting on fee title and conservation easements detailed in the 2012 Hunt Plan and therefore there would be no anticipated impacts.

4.1.6 Environmental Justice

Executive Order 12898 "Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations" was signed by President Bill Clinton on February 11, 1994, to focus federal attention on the environmental and human health conditions of minority and low-income populations with the goal of achieving environmental protection for all communities. The Order directed federal agencies to develop environmental justice strategies to aid in identifying and addressing disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations. The Order is also intended to promote nondiscrimination in federal programs substantially affecting human health and the environment, and to provide minority and low-income communities access to public information and participation in matters relating to human health or the environment. This assessment has not identified any adverse or beneficial effects for either alternative unique to minority or low-income populations in the affected area.

Neither alternative will disproportionately place any adverse environmental, economic, social, nor health impacts on minority or low income populations.

Hunting opportunities proposed on Patoka River NWR & MA already exist on state, federal and other public lands in the area where the Refuge units are located. Maintaining the "Closed to Hunting" status on Refuge fee title lands does not provide for all the priority public uses identified as goals of the Refuge or the National Wildlife Refuge System. The Refuge Recreation Act of 1962 (16 U.S.C. 460K) and the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668-ddee) provide authorization for hunting on National Wildlife Refuges. The effects of hunting on Refuges have been examined in several environmental review documents, including the Final Environmental Impact Statement on the Operation of the National Wildlife Refuge System (1976), Recommendations on the Management of the National Wildlife Refuge System (1978), and the Draft Environmental Impact Statement on the Management of the National Wildlife Refuges (1988). Nothing in the establishing authority for the Refuge precludes hunting on the Refuge.

SECTION 4.2 Alternative B: Preferred Alternative – Allow hunting on most fee title tracts and conservation easements detailed in the 2012 Hunt Plan and most lands added as addendums to the Hunt Plan in the future

Under this alternative, most of the fee title tracts and conservation easements detailed in the 2012 Hunt Plan and most lands added as addendums to the Hunt Plan in the future would be opened to hunting as allowed by federal regulations, Refuge-specific regulations, and the laws of the State of Indiana.

4.2.1 Habitat Impacts
Hunting access, in most cases, will be by foot access only. Parking will be restricted to designated parking lots. Impacts on vegetation should be temporary and similar to that occurring from non-consumptive users. Hunters with disabilities will be accommodated on a case by case basis.

4.2.2 Biological Impacts
Given the nature of these lands, disturbance of migratory birds, upland and small and big game, and resident wildlife will be the same as occurs on the surrounding state Fish and Wildlife Management Areas (FWA).

The harvest of Refuge wildlife species will be in accordance with Refuge-specific regulations, Federal regulations, and Indiana state limits. Other wildlife not being harvested will be disturbed by hunters approaching an animal's site, and flushing or moving the wildlife as the animals try to avoid human contact. This disturbance will be similar to the disturbance non hunted animals experience on state FWAs and will be minimal and temporary in nature.

4.2.3 Listed Species
No effect is expected for any federally listed threatened or endangered species or their critical habitat. A consultation pursuant to Section 7 of the Endangered Species Act was conducted as part of this EA and the updated Hunt Plan. A finding of "No Effects' was determined. No impacts are anticipated for state listed species.

4.2.4 Historic Properties and Cultural Resources
There are no historical properties documented on current Refuge lands. Hunting is not expected to cause ground disturbance or disturbance to standing structures and will have no effect on any historic properties located on lands acquired in the future.

4.2.5 Cumulative Impact Analysis of the Proposed Action

4.2.5.A Anticipated Direct and Indirect Impact of Proposed Hunting on Wildlife Species
The Service has allowed and administered a public hunting program on the Refuge since the 1996. Recent estimates show that the Refuge received approximately10, 450 hunting visits in 2012. During its history, the Service has not noted any significant adverse effects of these programs on the administration of the Refuge, and has determined that this use is compatible with the purposes of the Refuge and the NWR System's mission statement.

Hunting accounts for about 44% of the visits to the Refuge per year. The allowance of hunting on newly acquired Refuge lands will expose the largest user group to the Refuge habitats and facilitate a better appreciation and understanding of the bottomland hardwood forest ecosystem.. Also the allowance of public hunting will nurture a cooperative relationship with adjacent landowners by minimizing crop depredation. The majority of lands that will become Service owned tracts of Refuge are in private ownership when purchased by the Service. In Indiana, the majority of private rural lands are hunted on during at least some of the state seasons. Any

impacts that hunting is having on the land and its wildlife populations are already occurring and the change in ownership to the Service, and the subsequent hunting, will have little to no impact on wildlife populations.

In some cases, once owned by the Service, the hunting on these lands will be more restrictive than the current situation due to the Refuge's regulations being more restrictive than the state seasons.

Non-hunted Resident Wildlife:

Non-hunted wildlife would include small mammals such as voles, moles, mice, and shrews; reptiles and amphibians such as snakes, skinks, turtles, lizards, salamanders, frogs and toads; and invertebrates such as butterflies, moths, other insects and spiders. Except for migratory birds and some species of migratory butterflies and moths, these species have very limited home ranges and hunting would not affect their populations regionally.

Some species of butterflies and moths are migratory. Cumulative effects to these species at the "flyway" level should be negligible. Any hunter interaction would be similar to that of non-consumptive users. Disturbance to non-hunted wildlife would increase slightly. However, significant disturbance would be unlikely since small mammals are generally inactive during late November and December and many of these species are nocturnal. Both of these qualities make hunter interactions with small mammals very rare. Hibernation or torpor by cold-blood reptiles and amphibians also limits their activity when temperatures are low. Hunters would rarely encounter reptiles and amphibians during most of the hunting season. Invertebrates are also not active during cold weather and would have few interactions with hunters during the hunting season. Refuge regulations further mitigate possible disturbance by hunters to nonhunted wildlife. Vehicles are restricted to roads and the harassment or taking of any wildlife other than the game species legal for the season is not permitted.

White-tailed Deer

In the 2011 Indiana Deer Harvest Summary, the Indiana Department of Natural Resources (INDNR) reported deer harvest numbers from 1951 to 2011. The number of deer harvested in the state was below 20,000 until the early 1980's. Since then, the number of deer harvested has risen tremendously to a level where over 100,000 deer have been taken each year since 1992. Since 2004, hunters have harvested at least 120,000 deer each year. The report indicates that the 129, 018 deer harvested in 2011 was 4% less than the 134,004 deer harvested in 2010.

Within Pike (1,557 deer harvested) and Gibson (1,450 deer harvested) counties, where the Refuge is located, harvest numbers were about average for any Indiana county in 2011.

According to the Hunter/Harvest Report from Sugar Ridge Fish and Wildlife Area, an 8,100 acre property managed by the INDNR for hunting opportunities and adjacent to the Refuge, 50 deer were taken in 2010 and 60 deer were taken on the property in 2011. Nearly 4 deer were taken

per square mile at Sugar Ridge in 2010 and about 4.75 deer were taken per square mile in 2011.

The Refuge does not perform any management practices specifically for white-tailed deer, although they may benefit from some of the habitat management practices and habitat restoration efforts undertaken on the Refuge for other species. In addition, much of the Refuge can be flooded during parts of the state deer season, thereby taking away potential deer habitat for parts of the year.

As the Refuge stands at 8, 007 acres, it is estimated that less than 4.75 deer per square mile will be harvested, which indicates that less than 60 deer will be harvested on the Refuge in a given year, which accounts for 0.04% of the total deer harvest for the state in 2011. Opening 691.74 acres to hunting and closing 52 acres to hunting as proposed in the 2012 Hunt Plan will result in an estimated additional 4.75 deer harvested on newly opened Refuge lands per year, which equates to 0.003% of the total harvest for the state in 2011.

The Refuge has an approved boundary of 22, 472 acres (approximately 35 square miles) that could eventually be owned in fee title or conservation easement ownership. It is assumed that all of these acres will be opened to hunting. Using the 4.75 deer/square mile harvested on Sugar Ridge FWA as an estimate, a maximum total of around 166 deer could be taken on the Refuge per year if all the acres were under FWS control. One-hundred and sixty six deer would represent 0.13% of the 129,018 deer harvested in Indiana in 2011.

Wild Turkey

The Refuge does not perform any management practices specifically for wild turkey, although they may benefit from some of the habitat management practices and habitat restoration efforts undertaken on the Refuge for other species. In addition, much of the Refuge can be flooded during parts of the state deer season, thereby taking away potential wild turkey habitat for parts of the year.

According to the 2011 Spring and Fall Wild Turkey Harvest Results from the INDNR Division of Fish and Wildlife 12, 218 wild turkeys were harvested in Indiana by hunters in 2011. 154 wild turkeys (1.2% of the total harvest for IN) were harvested in Gibson County, while Pike County accounted for 254 harvested birds (2.1% of the total harvest for IN).

At Sugar Ridge FWA 16 wild turkeys were harvested in 2011 compared to 32 in 2010. Using the average number of 24 wild turkeys harvested on Sugar Ridge FWA in 2010 and 2011 over the 8,100 acre management area, it is estimated that 24 wild turkeys could be harvested on the 8,007 acre Refuge in any given year, or 0.1% of the total harvest in Indiana. Opening 691.74 acres to hunting and closing 52 acres to hunting as proposed in the 2012 Hunt Plan will result in an estimated additional 1.89 wild turkeys harvested on newly opened Refuge lands per year, or 0.01% of the harvested total for the state in 2011.

The Refuge has an approved boundary of 22, 472 acres (approximately 35 square miles) that

could eventually be owned in fee title or conservation easement ownership. It is assumed that all of these acres will be opened to hunting. Using the 24 wild turkey per 8,100 acres harvested on Sugar Ridge FWA as an estimate, a total of 66 wild turkey could be taken on the Refuge per year if all the acres were under FWS control. Sixty-six wild turkey would represent 0.5% of the 12, 218 wild turkey harvested in Indiana in 2011.

Bobwhite Quail

According to the Small Game Harvest Survey conducted by INDNR Division of Fish and Wildlife 13, 999 hunters harvested an estimated 21,102 bobwhites in Indiana during the 2008–2009 season, down 27 % from the 2005-2006 survey. Hunters in southwest Indiana, including Gibson and Pike Counties had the greatest success averaging 0.66 bobwhites harvested per hunting effort.

The Refuge currently provides approximately 1,000 acres of suitable quail habitat, most in scattered, small fragments. Within the 22,472 acre acquisition boundary exists perhaps another 1,000 acres of suitable habitat that could be added to the Refuge over time. Presently, the Refuge gets very few hunters pursuing quail on the small grassland areas. Some of the best quail habitat in Southwest Indiana is on reclaimed coal mined grasslands. Over time, as much of the local reclaimed coal mine ground is reverted to cropland or leased to private hunting parties, the Refuge could see an increased interest in quail hunting use.

In 2011 it was estimated that of 1800 upland game visits to the Refuge, that 50 were for quail hunting. Using the success rate of 0.66 birds harvested per day in the field as calculated by INDNR, it is estimated that 33 quail are harvested on the 8,007 acres under Refuge management in a given year, or 0.15% of the total harvest in Indiana. Opening 691.74 acres to hunting and closing 52 acres to hunting as proposed in the 2012 Hunt Plan will result in an estimated additional 10 quail hunts per year on newly opened Refuge lands per year, resulting in an additional 6.6 quail harvested, or 0.03% of the total harvest in Indiana..

The Refuge has an approved boundary of 22, 472 acres (approximately 35 square miles) that could eventually be owned in fee title or conservation easement ownership. According to the CCP, 2,139 acres of the Refuge will be managed as grassland potentially suitable for bobwhite quail once the Refuge is fully established. It is assumed that all of these acres would be open to hunting. This would double the amount of quail habitat the Refuge currently manages and would likely double the number of quail hunt days (from 50 to 100 quail hunts per year). Using 0.66 birds harvested per day, one-hundred quail hunts per year would result in a Refuge harvest of 66 quail. Sixty-six quail represent 0.3% of the 21,102 bobwhite quail harvested in Indiana in the 2008-2009 season.

Cottontail Rabbit

According to the Small Game Harvest Survey conducted by INDNR Division of Fish and Wildlife an estimated 69,453 cottontail hunters harvested an estimated 198,701 rabbits in Indiana

during the 2008–2009 season, about equal to the number harvested in 2005-2006 . Hunters in southwest Indiana had the greatest success averaging 0.82 cottontails harvested per hunting effort.

The Refuge currently provides approximately 1,000 acres of suitable rabbit habitat, most in scattered, small fragments. Within the 22,472 acre acquisition boundary exists perhaps another 1,000 acres of suitable habitat that could be added to the Refuge over time. In addition to managed grassland/shrublands, Refuge tree plantings provide temporary habitat for rabbits during the first few years after planting. To date the Refuge has planted trees on over 1,000 acres of agricultural fields with the ultimate goal of restoring hardwood forests.

In 2011 it was estimated that of the 1800 upland game visits to the Refuge, that 400 visits were for rabbit hunting. Using the success rate of 0.82 rabbits per day per hunter as described by INDNR, it is estimated that 328 rabbits are harvested on suitable habitat under Refuge management in a given year, or 0.16% of the total harvest for the state. Opening 691.74 acres to hunting and closing 52 acres to hunting as proposed in the 2012 Hunt Plan will result in an estimated additional 50 acres of potential rabbit habitat that could be hunted, an estimated additional 13 rabbit hunt visits per year, and an additional harvest of 11 rabbits or 0.005% of the total harvest for the state

The Refuge has an approved boundary of 22, 472 acres (approximately 35 square miles) that could eventually be owned in fee title or conservation easement ownership. According to the CCP, 2,139 acres of the Refuge will be managed as grassland/shrubland potentially suitable for cottontail rabbit once the Refuge is fully established. It is assumed that all of these acres would be open to hunting. This would double the amount of rabbit habitat the Refuge currently manages and would likely double the number of rabbit hunt days (from 400 to 800 rabbit hunts per year). Using 0.82 rabbits harvested per day, eight-hundred rabbit hunts per year would result in a harvest of 656 rabbits on the Refuge in a year. Six-hundred and fifty six rabbits represent 0.3% of the 198,701 rabbits harvested in Indiana in the 2008-2009 season.

Squirrel (Gray and Fox)

Gray Squirrel

According to the Small Game Harvest Survey conducted by INDNR Division of Fish and Wildlife an estimated 51,798 gray squirrel hunters harvested an estimated 161,546 gray squirrels in Indiana during the 2008– 2009 season up over 52% from 2005-2006. Hunters in south-central Indiana had the greatest success averaging 0.74 gray squirrels harvested per hunting effort.

The Refuge currently approximately 2,500 acres of mature large stands of hardwoods mostly in the eastern portion of the Refuge in Pike County that would provide ample habitat for the gray squirrel.

In 2011 it was estimated that of 1800 upland game visits to the Refuge, that 100 were for gray squirrel hunting. Using the success rate of 0.74 gray squirrel per day per hunter as described by

INDNR, it is estimated that 74 gray squirrels are harvested on suitable habitat under Refuge management each year, or 0.046% of the total harvest for the state. Opening 691.74 acres to hunting and closing 52 acres to hunting as proposed in the 2012 Hunt Plan will result in an estimated additional 600 acres of potential gray squirrel habitat that could be hunted, an estimated additional 7 gray squirrel hunt visits per year, and an additional harvest of 5.5 gray squirrel or 0.003% of the total harvest for the state in the 2008-2009 season.

The Refuge has an approved boundary of 22, 472 acres (approximately 35 square miles) that could eventually be owned in fee title or conservation easement ownership. According to the CCP, 17,997 acres of the Refuge will be managed as forest potentially suitable for gray squirrel once the Refuge is fully established. It is assumed that all of these acres would be open to hunting. This would more than double the amount of potential gray squirrel habitat the Refuge currently manages and would increase the number of gray squirrel hunt days (from 100 to 225 gray squirrel hunts per year). Using 0.74 gray squirrels harvested per day, two-hundred and twenty five gray squirrel hunts per year would result in a harvest of 166.5 gray squirrel on the Refuge in a year. One-hundred and sixty six gray squirrels represent 0.1% of the 161,546 gray squirrels harvested in Indiana in the 2008-2009 season.

Fox Squirrel

According to the Small Game Harvest Survey conducted by INDNR Division of Fish and Wildlife an estimated 76,608 fox squirrel hunters harvested an estimated 315,367 fox squirrels in Indiana during the 2008– 2009 season up over 52% from 2005-2006. Hunters in northwest and southwest Indiana had the greatest success averaging .85 fox squirrels harvested per hunting effort.

The Refuge currently provides a approximately 2,500 acres of fragmented forests interspersed with agricultural fields (both privately and Refuge owned) stands of hardwoods mostly in the western portion of the Refuge in Gibson County that provide suitable habitat for the fox squirrel.

In 2011 it was estimated that of 1800 upland game visits to the Refuge, that 500 were for fox squirrel hunting. Using the success rate of 0.85 fox squirrel per day per hunter as described by INDNR, it is estimated that 425 fox squirrels are harvested on suitable habitat under Refuge management each year, or 0.1% of the total harvest for the state. Opening 691.74 acres to hunting and closing 52 acres to hunting as proposed in the 2012 Hunt Plan will result in an estimated additional 600 acres of potential fox squirrel habitat that could be hunted, an estimated additional 37 fox squirrel hunt visits per year, and an additional harvest of 31 fox squirrel or 0.01% of the total harvest for the state in the 2008-2009 season.

The Refuge has an approved boundary of 22, 472 acres (approximately 35 square miles) that could eventually be owned in fee title or conservation easement ownership. According to the CCP, 17,997 acres of the Refuge will be managed as forest potentially suitable for fox squirrel once the Refuge is fully established. It is assumed that all of these acres would be open to hunting. This would more than double the amount of potential fox squirrel habitat the Refuge

currently manages and would increase the number of gray squirrel hunt days (from 425 to 956 fox squirrel hunts per year). Using 0.85 fox squirrels harvested per day, nine-hundred and fifty-six fox squirrel hunts per year would result in a harvest of 812.6 fox squirrel on the Refuge in a year, or 0.2% of the 315,367 fox squirrels harvested in Indiana in the 2008-2009 season.

Raccoon, Fox (Red and Gray), Coyote, and Opossum

INDNR Division of Fish and Game show stable, huntable populations of these species and have hunting and trapping programs. This alternative would only allow the hunting of these species. The hunting of these species is dependent on the price of pelts in any given year. Weather also plays a part in harvest. DNR estimates for harvest by hunters for the 2008-2009 seasons are shown on Table 2.

Table 2. 2008-2009 State Harvest Estimate for Hunting

Species	**Indiana Harvest**
Raccoon	149,397
Fox (Red and Gray)	2,372 (red) 415 (gray)
Coyote	29,128
Opossum	4,212

Hunting regulations for these species on Patoka River NWR & MA units require a Refuge permit. Available habitat on Refuge units will limit harvest.

In 2011, 19 permits were given out for hunting furbearers on the 8,007 acres under Refuge management. One permit can cover a hunter for multiple species of furbearers. Of these 19 permits, 14 included coyote, 6 included raccoon, 5 included fox, and 0 included opossum. The results of the 2011 harvest reports from hunters indicated the following furbearers were taken on the Refuge: 0 raccoon, 0 fox, 3 coyote (0.01% of the state harvest from 2008-2009), and 0 opossum.

Opening 691.74 acres to hunting and closing 52 acres to hunting as proposed in the 2012 Hunt Plan will result in an estimated additional 1.66 Refuge permits given for hunting furbearers and could result in an additional harvest of 0 raccoon, 0 fox, 0.26 coyote (0.0009% of the total state harvest in 2008-2009), and 0 opossum.

The Refuge has an approved boundary of 22, 472 acres (approximately 35 square miles) that could eventually be owned in fee title or conservation easement ownership. It is assumed that all of these acres would be open to hunting. Opening the entire Refuge to hunting would result in an estimated 53 furbearer permits issued and could result in an additional harvest of 8.4 coyotes (0.03% of the total state harvest in 2008-2009). Raccoon, fox, and opossum harvest would remain well below 0.1% of the state harvest total.

Non-hunted Resident Wildlife

Non-hunted wildlife would include small mammals such as voles, moles, mice, and shrews; reptiles and amphibians such as snakes, skinks, turtles, lizards, salamanders, frogs and toads; and invertebrates such as butterflies, moths, other insects and spiders. Except for migratory birds and some species of migratory butterflies and moths, these species have very limited home ranges and hunting would not affect their populations regionally.

Some species of butterflies and moths are migratory. Cumulative effects to these species at the "flyway" level should be negligible. Any hunter interaction would be similar to that of non-consumptive users. Disturbance to non-hunted wildlife would increase slightly. However, significant disturbance would be unlikely since small mammals are generally inactive during late November and early December and many of these species are nocturnal. Both of these qualities make hunter interactions with small mammals very rare. Hibernation or torpor by cold-blood reptiles and amphibians also limits their activity when temperatures are low. Hunters would rarely encounter reptiles and amphibians during most of the hunting season. Invertebrates are also not active during cold weather and would have few interactions with hunters during the hunting season. Refuge regulations further mitigate possible disturbance by hunters to nonhunted wildlife. Vehicles are restricted to roads and the harassment or taking of any wildlife other than the game species legal for the season is not permitted.

Migratory Birds

Migratory game birds are those bird species so designated in conventions between the United States and several foreign nations for the protection and management of these birds. Under the Migratory Bird Treaty Act (16 U.S.C.703-712), the Secretary of the Interior is authorized to determine when "hunting, taking, capture, killing, possession, sale, purchase, shipment, transportation, carriage, or export of any ... bird, or any part, nest, or egg" of migratory game birds can take place, and to adopt regulations for this purpose. These regulations are written after giving due regard to "the zones of temperature and to the distribution, abundance, economic value, breeding habits, and times and lines of migratory flight of such birds, and are updated annually (16 U.S.C. 704(a)). This responsibility has been delegated to the U.S. Fish and Wildlife Service as the lead federal agency for managing and conserving migratory birds in the United States. Acknowledging regional differences in hunting conditions, the Service has administratively divided the nation into four Flyways for the primary purpose of managing migratory game birds. Each Flyway (Atlantic, Mississippi, Central, and Pacific) has a Flyway Council, a formal organization generally composed of one member from each State and Province in that Flyway. Patoka River NWR & MA is located in the Mississippi Flyway.

The process for adopting migratory game bird hunting regulations, located in 50 CFR part 20, is constrained by three primary factors. Legal and administrative considerations dictate how long the rule making process will last. Most importantly, however, the biological cycle of migratory game birds controls the timing of data-gathering activities and thus the dates on which these

results are available for consideration and deliberation. The process of adopting migratory game bird hunting regulations includes two separate regulations-development schedules based on "early" and "late" hunting season regulations. Early hunting seasons pertain to all migratory game bird species in Alaska, Hawaii, Puerto Rico, and the Virgin Islands; migratory game birds other than waterfowl (e.g. dove, woodcock, etc.); and special early waterfowl seasons, such as teal or resident Canada geese. Early hunting seasons generally begin prior to October 1. Late hunting seasons generally start on or after October 1 and include most waterfowl seasons not already established. There are basically no differences in the processes for establishing either early or late hunting seasons. For each cycle, Service biologists and others gather, analyze, and interpret biological survey data and provide this information to all those involved in the process through a series of published status reports and presentations to Flyway Councils and other interested parties.

Because the Service is required to take an abundance of migratory birds and other factors in to consideration, the Service undertakes a number of surveys throughout the year in conjunction with the Canadian Wildlife Service, State and Provincial wildlife-management agencies, and others. To determine the appropriate framework for each species, the Service considers factors such as population size and trend, geographical distribution, annual breeding effort, the condition of breeding and wintering habitat, the number of hunters, and the anticipated harvest. After frameworks are established for season lengths, bag limits, and areas for migratory game bird hunting, migratory game bird management becomes a cooperative effort of State and Federal Governments. After Service establishment of final frameworks for hunting seasons, the States may select season dates, bag limits, and other regulatory options for the hunting seasons. States may always be more conservative in their selections than the Federal frameworks but never more liberal. Season dates and bag limits for National Wildlife Refuges open to hunting are never longer or larger than the State regulations. In fact, based upon the findings of an environmental assessment developed when a National Wildlife Refuge opens a new hunting activity, season dates and bag limits may be more restrictive than the State allows. The waterfowl season on Patoka River NWR & MA units will follow the frameworks set in place for Indiana.

Waterfowl

Waterfowl surveys are conducted during the late fall, winter, and early spring seasons. The data are used to provide managers and the public with current information on the distribution and abundance of waterfowl using the Refuge, and to identify annual trends in waterfowl use of wetlands and impoundments on the Refuge.

During the fall, winter, and spring, the Refuge wetlands support thousands of waterfowl, including Swans, Snow Geese, Canada Geese, Wood Ducks, Northern Pintail, Ring-necked Ducks, Mallards, Gadwall, American Wigeon, Northern Shoveler, Blue-winged Teal, and Green-winged Teal that use the Refuge as a stopover for rest and forage. Waterfowl that use the Refuge for nesting include Canada Goose, Mallard, Wood Duck, and Hooded Merganser.

The peak time for waterfowl use on the Refuge is January through mid-February (see Table 3). Aerial waterfowl surveys conducted in 2011 and 2012 indicated that over 17,000 ducks and geese may be using the Refuge along the Patoka River during this peak season. Over 200,000 ducks, geese, and swans have been documented in the area on February 8th, 2011 at Gibson Lake (Duke Energy), Tern Bar Slough (INDNR), and Cane Ridge (Refuge) (see Table 4). Currently, INDNR has set the South Zone seasons for ducks at November 24th through January 20th and geese at November 24th through January 27th. These dates provide hunting opportunities on the Refuge when waterfowl use is near its height.

Table 3. Aerial Waterfowl Inventory Data for Patoka River NWR & MA 2011 and 2012. Aerial survey below includes the western section of the Patoka River from HWY 41 to HWY 57.

2011								
	1/14/2011	*2/8/2011*	*2/15/2011*	*2/23/2011*				
Total Ducks	3,150	7,300	1,350	1,860				
Total Geese	925	4,350	1,790	425				
Total Ducks/Geese	4,075	11,650	3,140	2,285				
2012								
	1/18/2012	*2/3/2012*	*2/17/2012*	*2/22/2012*	*2/28/2012*	*3/5/2012*	*3/16/2012*	*3/28/2012*
Total Ducks	9,630	15,900	16,040	13,435	12,720	6,690	8,440	2,160
Total Geese	855	1200	855	480	115	75	20	15
Total Ducks/Geese	10,485	17,100	16,895	13,915	12,835	6,765	8,460	2,175

Table 4. Aerial Waterfowl Inventory Data for Patoka River NWR & MA 2011 and 2012. Aerial survey below includes Gibson Lake (Duke Energy), Tern Bar Slough (INDNR), and Cane Ridge Fish and Wildlife Area (FWS, managed by the Refuge).

2011									
	1/14/2011	*2/8/2011*	*2/15/2011*	*2/23/2011*	*3/1/2012*	*3/6/2011*	*3/16/2011*	*3/24/2011*	*4/12/2011*
Total Ducks	56,600	63,000	215	495	320	1,610	150	1,825	150
Total Geese	57,160	148,800	6,380	50	40	110	10	15	0
Total Ducks/Geese	113,760	211,800	6,595	545	360	1,720	160	1,840	150
2012									
	1/18/2012	*1/24/2012*	*2/3/2012*	*2/17/2012*	*2/22/2012*	*2/28/2012*	*3/5/2012*	*3/16/2012*	*3/28/2012*
Total Ducks	22,900	7,855	3,200	7,155	3,205	1,965	2,090	8,440	1,245
Total Geese	132,050	91,230	1,210	86,340	30,205	12,070	15,330	20	50
Total Ducks/Geese	154,950	99,085	4,410	93,495	33,410	14,035	17,420	8,460	1,295

In the July 2011 ***Migratory Bird Hunting Activity and Harvest During the 2010 and 2011 Hunting Seasons*** report, the Service estimates the seasonal duck harvest in Indiana to be 94,100 (2010) and 123,200 (2011) (see Figure 1). Ducks harvested per hunter day afield in Indiana was 1.39 (2010) and 1.45 (2011).

There are 76 days of duck hunting in SW Indiana for 2012 (early Teal season 9/1-9/16, regular duck season 11/3-11/4, 11/24-1/20). An estimated 50 duck hunters use the Refuge each day on the weekend (26 days), while an estimated 15 duck hunters use the Refuge each day during the week (50 days) for a total of 2,050 duck hunt users. Using an average of 1.42 ducks per day afield from the 2010-2011 seasons multiplied by 2,050 duck hunt visits to the Refuge indicates an 2,911 ducks (or 2.36% of the total harvest for the state) may be harvested on the Refuge in a given year.

Opening 691.74 acres to hunting and closing 52 acres to hunting as proposed in the 2012 Hunt Plan will result in an estimated 100 acres of suitable duck hunting opportunities, 26 additional hunt use days, and an additional harvest of 37 ducks, or 0.03% of the total harvest for the state in the 2011 season.

The Refuge has an approved boundary of 22, 472 acres (approximately 35 square miles) that could eventually be owned in fee title or conservation easement ownership. It is assumed that all of these acres would be open to hunting. Under full ownership, the Refuge would provide an estimated 3,075 duck hunter use days per year (about 1.5 times more than the current ownership allows, as the largest and most accessible duck hunting areas are already part of the Refuge). Using 1.42 ducks harvested per day, 3,075 duck hunts per year would result in a harvest of 4,367 ducks harvested on the Refuge in a year, or 3% of the total ducks harvested in Indiana in the 2011 season.

In the July 2011 ***Migratory Bird Hunting Activity and Harvest During the 2010 and 2011 Hunting Seasons*** report, the Service estimates the seasonal goose harvest in Indiana to be 74,800 (2010) and 49,600 (2011) (see Figure 2). Geese harvested per hunter day afield in Indiana was .95 (2010) and .66 (2011).

When compared to duck hunting, it is estimated that about ten percent of the waterfowl visits are specifically for geese. Currently, the Refuge has approximately 205 goose hunt visits per year. Using an average of .81 geese averaged per day afield from the 2010-2011 seasons multiplied by 205 goose hunt visits to the Refuge indicates that 166 geese (or 0.3% of the total harvest for the state in 2011) may be harvested on the Refuge in a given year.

Opening 691.74 acres to hunting and closing 52 acres to hunting as proposed in the 2012 Hunt Plan will result in an estimated 100 acres of suitable goose hunting opportunities, 16 additional hunt use days, and an additional harvest of 13 geese, or 0.02% of the total harvest for the state in the 2011 season.

The Refuge has an approved boundary of 22, 472 acres (approximately 35 square miles) that

could eventually be owned in fee title or conservation easement ownership. It is assumed that all of these acres would be open to hunting. Under full ownership, the Refuge would provide an estimated 307.5 goose hunter use days per year (about 1.5 times more than the current ownership allows, as the largest and most accessible goose hunting areas are already part of the Refuge). Using .81 geese harvested per day, 307.5 goose hunts per year would result in a harvest of 249 geese harvested on the Refuge in a year, or 0.5% of the total geese harvested in Indiana in the 2011 season.

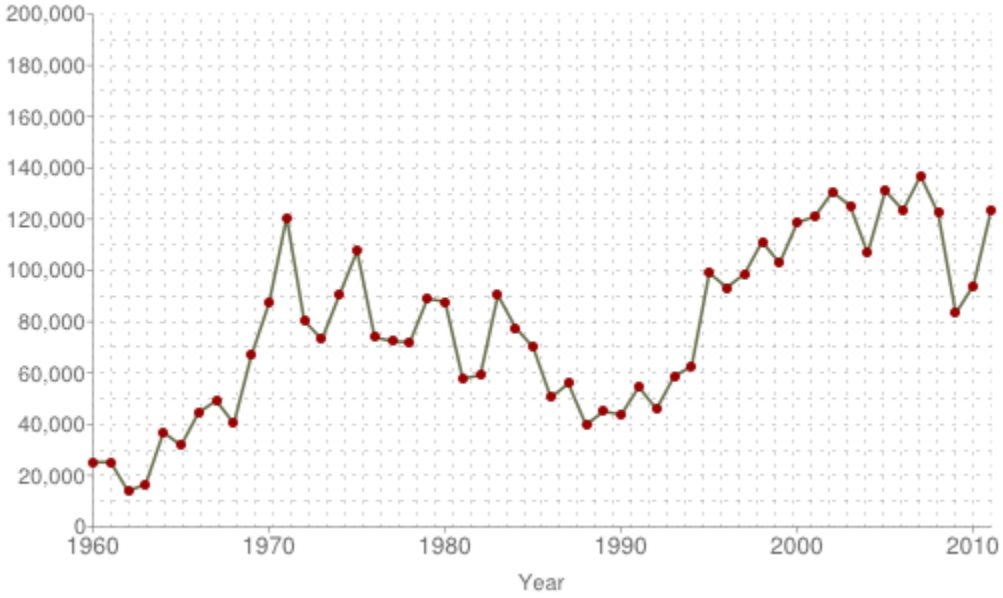

Figure 1. Total Number of Ducks Harvested in Indiana 1960-2011 (USFWS)

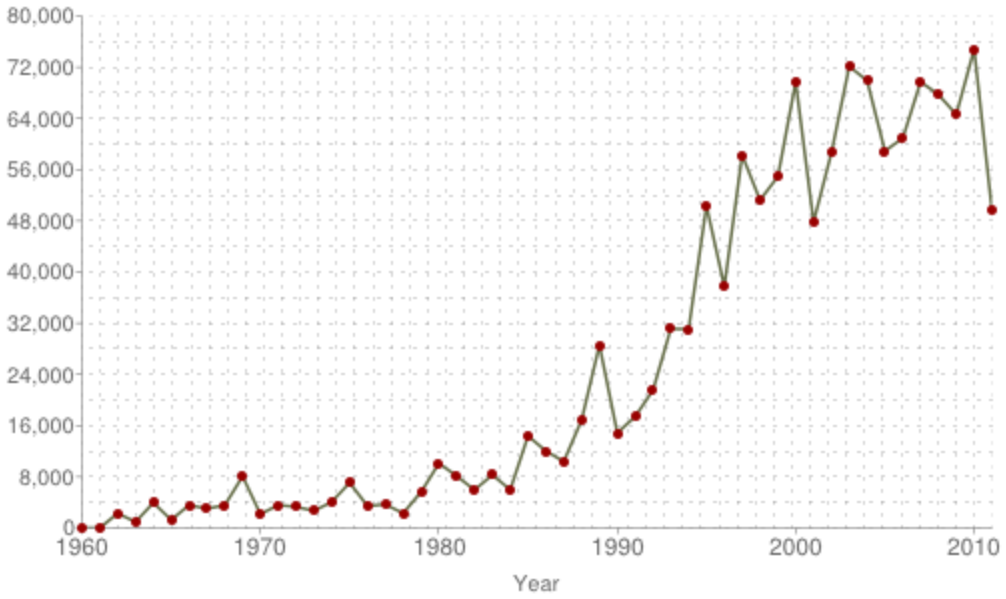

Figure 2. Total Number of Geese Harvested in Indiana 1960-2011 (USFWS)

Mourning Doves

In the July 2011 ***Migratory Bird Hunting Activity and Harvest During the 2010 and 2011 Hunting Seasons*** report, the Service estimates the seasonal mourning dove harvest in Indiana to be 187,700 (2010) and 216,900 (2011). Doves harvested per hunter day afield in Indiana was 6.27 (2010) and 5.74 (2011). In the 2012 RAPP the Refuge had an estimated 50 migratory bird hunt visits for the year (an estimated 40 of these were for doves). Using an average of 6 doves per day afield from the 2010-2011 seasons multiplied by 40 dove hunt visits to the Refuge indicates an estimated 240 doves may have been harvested on the Refuge in a given year, or 0.1% of the total dove harvest for the state.

Opening 691.74 acres to hunting and closing 52 acres to hunting as proposed in the 2012 Hunt Plan will result in an estimated 100 acres of suitable dove hunting opportunities, .5 additional dove hunt use days, and an additional harvest of 3 doves, or 0.001% of the total harvest for the state in the 2011 season.

The Refuge has an approved boundary of 22, 472 acres (approximately 35 square miles) that could eventually be owned in fee title or conservation easement ownership. It is assumed that all of these acres would be open to hunting. Under full ownership, the Refuge would provide an estimated 120 dove hunting use days. Using 6 doves harvested per day, 120 dove hunts per year would result in a harvest of 720 doves harvested on the Refuge in a year, or 0.3% of the total doves harvested in Indiana in the 2011 season.

Woodcock, Snipe, Sora, and Coot

Although these species are all heard and seen on the Refuge, very few hunters attempt to harvest

these species. The Refuge estimates 10 hunt visits per year total for woodcock, snipe, and sora, with an estimated total of 2 woodcock (0.1% of the state harvest total in 2009), 3 snipe (0.5% of state harvest total from 2010), and 3 sora (0.09% of the state harvest total for rails) taken on the Refuge per year. For coot, it is estimated that two percent (or 41 vistits) of the 2,050 waterfowl visits per year are for coot hunting. In the July 2011 Migratory Bird Hunting Activity and Harvest During the 2011 Hunting Seasons report, the Service estimates the seasonal coot harvest to be 1.2 coots harvested per day afield, indicating the harvest on the Refuge is 49 coots per year, or 2.7% of the total harvest for the state.

Opening 691.74 acres to hunting and closing 52 acres to hunting as proposed in the 2012 Hunt Plan will result in a minimal harvest increase of 3/10 of one bird or less for woodcock, snipe, and sora, which amounts to less than one-percent of the harvested total for the state for each species. For coot, an estimated 3.3 additional hunt days would occur and 4 coot would be harvested, or 0.2% of the state harvest total for 2011.

The Refuge has an approved boundary of 22, 472 acres (approximately 35 square miles) that could eventually be owned in fee title or conservation easement ownership. It is assumed that all of these acres would be open to hunting. Under full ownership, the Refuge would provide an estimated 30 woodcock, snipe, and/or sora hunt days total. When the entire acreage is managed by the Service an estimated 6 woodcock (0.3% of the state harvest), 9 snipe (2% of the state harvest), and 9 sora (0.2% of the state harvest) may be taken on the Refuge in a given year. For coot, an estimated 115 total coot hunt days would occur and 138 coot would be harvested, or 7.6% of the state harvest total for 2011.

4.2.5.B Anticipated Direct and Indirect Impact of Proposed Hunting on Refuge Programs, Facilities, and Cultural Resources

Other Refuge Wildlife-Dependent Recreation

Approximately 23,500 visitors used Refuge lands in 2012. In addition to hunting (10,450 vistits) which made up the majority of visits, the Refuge had 5,100 fishing visits and 8,235 wildlife observation, photography, and environmental education, interpretation visits combined.

The majority of the fishing, wildlife observation, environmental education, and interpretation activities occur in the spring, summer and early fall. Due to this seasonality, conflicts with hunting are expected to be minimal. Although fishing takes place year round on the Refuge, conflict with other uses should be minimal because of the nature of the use. Varied public uses have taken place on the Refuge since 1996 and conflicts between hunters and non-hunters such as wildlife observation, environmental education and interpretation have been minimal.

This alternative will give the public the opportunity to participate in another wildlife-oriented recreation that is compatible with the purposes for which the Refuge was established and have an increased awareness of the Patoka River NWR & MA and the National Wildlife Refuge System. The Service will be meeting public use demand and public relations will be enhanced with the local communities.

Refuge Facilities
Few, if any, additional impacts to Refuge facilities (roads, parking lots, and trails) will occur with this alternative. Refuge facilities will receive an increase in use with the addition of consumptive visitors, but the impacts would be minimal. Any maintenance or improvement of existing roads and parking areas will cause minimal short term impacts to localized soils and may cause some temporary wildlife disturbance.

Physical developments to accommodate the public's use and enjoyment of these Refuge lands will generally be limited to small parking areas, informational and educational signs, and access roads. On some units, short hiking trails and wildlife observation areas may be developed. Disturbance by vehicles will be limited to existing parking areas. Special access accommodations for persons with disabilities could be allowed. These accommodations will be made on a case by case basis by the Refuge manager.

Cultural Resources
This alternative will not have any additional impacts to cultural resources. Hunting activities will result in no ground disturbance or disturbance to standing structures and would have no effect on any historic properties.

4.2.5.C Anticipated Direct and Indirect Impact of Proposed Hunting on Refuge Environment and Community

Refuge personnel expect no measurable adverse impacts by this proposed action on the Refuge environment which includes soils, vegetation, air quality, water quality and solitude. Some disturbance to surface soils and vegetation would occur in some areas, however these disturbances would be minimal. Access would also be controlled to minimize habitat degradation.

The Service owns and administers numerous National Wildlife Refuges that are distributed throughout the country. All Refuge lands are part of the NWR System and the Service's primary purpose for these lands is to ensure the preservation of migratory birds, threatened and endangered species, and resident wildlife. An additional primary purpose established by the Service for these lands is to provide opportunities for the public to hunt, fish, observe and photograph wildlife, and increase public understanding and appreciation of the different ecosystems.

As a result of this alternative, expenditures by visitors for meals, lodging and transportation would increase in the communities where these Refuge lands are located. According to the 2011 National Survey of Fishing, Hunting, and Wildlife Associated Recreation, hunting and fishing expenditures in Indiana totaled $1.02 billion. Also in 2011, $752 million was spent on non-consumptive recreational activities in Indiana. Municipalities and community organizations could bring additional tourism revenues into their economies by establishing partnerships with the Service to develop and promote the recreational opportunities that are available on the

Refuge lands surrounding their communities.

Impacts of the Proposed Action on the Refuge physical environment would have minimal to negligible effects to surface soils, topography, and vegetation that occur in areas opened to hunting. Newly acquired acreage would be utilized more by the public (hunters) than had been previously and might cause increased trampling of vegetation, however the impacts should be minor. Refuge regulations do not permit the use of vehicles off of designated Refuge roads. Vehicles for hunters with disabilities would be confined to existing roads and parking lots.

Hunting would benefit vegetation as it is used to keep resident deer populations in balance with the carrying capacity of the habitat.

Impacts to the natural hydrology would be negligible. The Refuge staff expects impacts to air and water quality to be minimal and only due to Refuge visitor's use of automobiles on adjacent township and county public roads. The effect of these Refuge-related activities on overall air and water quality in the region are anticipated to be negligible.

Impacts associated with solitude are expected to be minimal given the limited time, season, and space management techniques used to avoid conflicts among user groups.

Public hunting on the Refuge should not adversely impact the soils, vegetation, air and water quality, solitude, or the Service's management activities for the Refuge lands. The establishment of a hunting program for the Refuge could positively impact the local economy by drawing visitors to the area who would likely spend money in the community.

The Preferred Alternative would have similar minimal to negligible effects on human health and safety.

There is a potential to have some minimal disturbance on the general public, nearby residents, and Refuge visitors. The disturbance factor is considered minimal, as hunting has occurred on the Refuge since 1996, as well as thousands of acres of state properties and private property in southwest Indiana. It is possible that Refuge hunting will increase hunting opportunities on surrounding lands, by increasing the wildlife moving beyond the boundary of the individual Refuge units.

4.2.5.D Other Past, Present, Proposed, and Reasonably Foreseeable Hunting Activities and Anticipated Impacts

Hunting has been allowed on Patoka River NWR & MA since the first Hunting and Fishing Plan was approved and registered in the Code of Federal Regulations in 1996. If public use levels expand in the future, unanticipated conflicts between user groups may occur. Service experience has proven that time and space zoning can be an effective tool in eliminating conflicts between user groups. On a case by case basis, the Refuge Manager will determine if such a tool is necessary to limit conflicts.

4.2.5.E Anticipated Impacts If Individual Hunts Are Allowed To Accumulate

National Wildlife Refuges, including Patoka River NWR & MA, conduct or will conduct hunting programs within the framework of State and Federal regulations. The Preferred Alternative is at least as restrictive as the State of Indiana and in some cases, the hunts will be more restrictive. By maintaining hunting regulations that are as, or more, restrictive than the State, individual Refuges ensure that they are maintaining seasons which are supportive of management on a regional basis.

The final EIS was reviewed by and the selected alternative supported by the Indiana Department of Natural Resources (INDNR) stated that hunting would be permitted on most fee title units of the Refuge. Additionally, the Refuge coordinates with the INDNR annually to maintain regulations and programs that are consistent with the States' management program.
The hunting of big game, upland/small game, and migratory bird game species will have minimal impacts to local, regional, state, and flyway populations. The majority of these lands were open to hunting before being acquired by the Service. Refuge personnel expect there will be a slight increase in the number animals harvested on Refuge lands as when these lands were in private ownership. Refuge personnel expect and witness that most hunters respect spacing needs between hunters and blinds and will essentially regulate themselves. User conflicts might occur between non-consumptive users and hunters. This not expected, as hunting seasons take place when most non-consumptive uses (wildlife observation, photography) have become minimal, after early October.

4.2.6. Environmental Justice

Executive Order 12898 "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" was signed by President Bill Clinton on February 11, 1994, to focus federal attention on the environmental and human health conditions of minority and low-income populations with the goal of achieving environmental protection for all communities. The Order directed federal agencies to develop environmental justice strategies to aid in identifying and addressing disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations. The Order is also intended to promote nondiscrimination in federal programs substantially affecting human health and the environment, and to provide minority and low-income communities' access to public information and participation in matters relating to human health or the environment. This assessment has not identified any adverse or beneficial effects for either alternative unique to minority or low-income populations in the affected area. None of the alternatives will disproportionately place any adverse environmental, economic, social, nor health impacts on minority or low-income populations.

SECTION 4.3 Alternative C: Allow hunting on all fee title tracts and conservation easements detailed in the 2012 Hunt Plan and all lands added as addendums to the Hunt

Plan in the future

Under this alternative, all of the fee title tracts and conservation easements described in the 2012 Hunt Plan and all lands added as addendums to the Hunt Plan in the future would be opened to hunting as allowed by federal regulations, Refuge-specific regulations, and the laws of the State of Indiana. The Refuge Manager would not have the flexibility to close units for any other reason than public safety. *Because there is only a slight difference between this alternative and the preferred alternative, the Environmental Consequences of this alternative are basically the same as Alternative B.*

4.3.1 Habitat Impacts

Hunting access, in most cases, will be by foot access only. Parking will be restricted to designated parking lots. Impacts on vegetation should be temporary and similar to that occurring from non-consumptive users. Hunters with disabilities will be accommodated on a case by case basis.

4.3.2 Biological Impacts

Given the nature of these lands, disturbance of migratory birds, upland and small and big game, and resident wildlife will be the same as occurs on the surrounding state Fish and Wildlife Management Areas (FWA).

The harvest of Refuge wildlife species will be in accordance with Refuge-specific regulations, Federal regulations, and Indiana state limits. Other wildlife not being harvested will be disturbed by hunters approaching an animal's site, and flushing or moving the wildlife as the animals try to avoid human contact. This disturbance will be similar to the disturbance non hunted animals experience on state FWAs and will be minimal and temporary in nature.

4.3.3 Listed Species

No effect is expected for any federally listed threatened or endangered species or their critical habitat. A consultation pursuant to Section 7 of the Endangered Species Act was conducted as part of this EA and the updated Hunt Plan. A finding of "No Effects' was determined. No impacts are anticipated for state listed species.

4.3.4 Historic Properties and Cultural Resources

There are no historical properties documented on current Refuge lands. Hunting is not expected to cause ground disturbance or disturbance to standing structures and will have no effect on any historic properties located on lands acquired in the future.

4.3.5 Cumulative Impact Analysis of the Proposed Action

4.3.5.A Anticipated Direct and Indirect Impact of Proposed Hunting on Wildlife Species

The Service has allowed and administered a public hunting program on the Refuge since the 1996. Recent estimates show that the Refuge received approximately10, 450 hunting visits in 2012. During its history, the Service has not noted any significant adverse effects of these

programs on the administration of the Refuge, and has determined that this use is compatible with the purposes of the Refuge and the NWR System's mission statement.

Hunting accounts for about 44% of the visits to the Refuge per year. The allowance of hunting on newly acquired Refuge lands will expose the largest user group to the Refuge habitats and facilitate a better appreciation and understanding of the bottomland hardwood forest ecosystem.. Also the allowance of public hunting will nurture a cooperative relationship with adjacent landowners by minimizing crop depredation. The majority of lands that will become Service owned tracts of Refuge are in private ownership when purchased by the Service. In Indiana, the majority of private rural lands are hunted on during at least some of the state seasons. Any impacts that hunting is having on the land and its wildlife populations are already occurring and the change in ownership to the Service, and the subsequent hunting, will have little to no impact on wildlife populations.

In some cases, once owned by the Service, the hunting on these lands will be more restrictive than the current situation due to the Refuge's regulations being more restrictive than the state seasons.

Non-hunted Resident Wildlife:

Non-hunted wildlife would include small mammals such as voles, moles, mice, and shrews; reptiles and amphibians such as snakes, skinks, turtles, lizards, salamanders, frogs and toads; and invertebrates such as butterflies, moths, other insects and spiders. Except for migratory birds and some species of migratory butterflies and moths, these species have very limited home ranges and hunting would not affect their populations regionally.

Some species of butterflies and moths are migratory. Cumulative effects to these species at the "flyway" level should be negligible. Any hunter interaction would be similar to that of non-consumptive users. Disturbance to non-hunted wildlife would increase slightly. However, significant disturbance would be unlikely since small mammals are generally inactive during late November and December and many of these species are nocturnal. Both of these qualities make hunter interactions with small mammals very rare. Hibernation or torpor by cold-blood reptiles and amphibians also limits their activity when temperatures are low. Hunters would rarely encounter reptiles and amphibians during most of the hunting season. Invertebrates are also not active during cold weather and would have few interactions with hunters during the hunting season. Refuge regulations further mitigate possible disturbance by hunters to nonhunted wildlife. Vehicles are restricted to roads and the harassment or taking of any wildlife other than the game species legal for the season is not permitted.

White-tailed Deer

In the 2011 Indiana Deer Harvest Summary, the Indiana Department of Natural Resources (INDNR) reported deer harvest numbers from 1951 to 2011. The number of deer harvested in the state was below 20,000 until the early 1980's. Since then, the number of deer harvested has

risen tremendously to a level where over 100,000 deer have been taken each year since 1992. Since 2004, hunters have harvested at least 120,000 deer each year. The report indicates that the 129, 018 deer harvested in 2011 was 4% less than the 134,004 deer harvested in 2010.

Within Pike (1,557 deer harvested) and Gibson (1,450 deer harvested) counties, where the Refuge is located, harvest numbers were about average for any Indiana county in 2011.

According to the Hunter/Harvest Report from Sugar Ridge Fish and Wildlife Area, an 8,100 acre property managed by the INDNR for hunting opportunities and adjacent to the Refuge, 50 deer were taken in 2010 and 60 deer were taken on the property in 2011. Nearly 4 deer were taken per square mile at Sugar Ridge in 2010 and about 4.75 deer were taken per square mile in 2011.

The Refuge does not perform any management practices specifically for white-tailed deer, although they may benefit from some of the habitat management practices and habitat restoration efforts undertaken on the Refuge for other species. In addition, much of the Refuge can be flooded during parts of the state deer season, thereby taking away potential deer habitat for parts of the year.

As the Refuge stands at 8, 007 acres, it is estimated that less than 4.75 deer per square mile will be harvested, which indicates that less than 60 deer will be harvested on the Refuge in a given year, which accounts for 0.04% of the total deer harvest for the state in 2011. Opening 691.74 acres to hunting and closing 52 acres to hunting as proposed in the 2012 Hunt Plan will result in an estimated additional 4.75 deer harvested on newly opened Refuge lands per year, which equates to 0.003% of the total harvest for the state in 2011.

The Refuge has an approved boundary of 22, 472 acres (approximately 35 square miles) that could eventually be owned in fee title or conservation easement ownership. It is assumed that all of these acres will be opened to hunting. Using the 4.75 deer/square mile harvested on Sugar Ridge FWA as an estimate, a maximum total of around 166 deer could be taken on the Refuge per year if all the acres were under FWS control. One-hundred and sixty six deer would represent 0.13% of the 129,018 deer harvested in Indiana in 2011.

Wild Turkey

The Refuge does not perform any management practices specifically for wild turkey, although they may benefit from some of the habitat management practices and habitat restoration efforts undertaken on the Refuge for other species. In addition, much of the Refuge can be flooded during parts of the state deer season, thereby taking away potential wild turkey habitat for parts of the year.

According to the 2011 Spring and Fall Wild Turkey Harvest Results from the INDNR Division of Fish and Wildlife 12, 218 wild turkeys were harvested in Indiana by hunters in 2011. 154 wild turkeys (1.2% of the total harvest for IN) were harvested in Gibson County, while Pike County accounted for 254 harvested birds (2.1% of the total harvest for IN).

At Sugar Ridge FWA 16 wild turkeys were harvested in 2011 compared to 32 in 2010. Using the average number of 24 wild turkeys harvested on Sugar Ridge FWA in 2010 and 2011 over the 8,100 acre management area, it is estimated that 24 wild turkeys could be harvested on the 8,007 acre Refuge in any given year, or 0.1% of the total harvest in Indiana. Opening 691.74 acres to hunting and closing 52 acres to hunting as proposed in the 2012 Hunt Plan will result in an estimated additional 1.89 wild turkeys harvested on newly opened Refuge lands per year, or 0.01% of the harvested total for the state in 2011.

The Refuge has an approved boundary of 22, 472 acres (approximately 35 square miles) that could eventually be owned in fee title or conservation easement ownership. It is assumed that all of these acres will be opened to hunting. Using the 24 wild turkey per 8,100 acres harvested on Sugar Ridge FWA as an estimate, a total of 66 wild turkey could be taken on the Refuge per year if all the acres were under FWS control. Sixty-six wild turkey would represent 0.5% of the 12, 218 wild turkey harvested in Indiana in 2011.

Bobwhite Quail

According to the Small Game Harvest Survey conducted by INDNR Division of Fish and Wildlife 13, 999 hunters harvested an estimated 21,102 bobwhites in Indiana during the 2008–2009 season, down 27 % from the 2005-2006 survey. Hunters in southwest Indiana, including Gibson and Pike Counties had the greatest success averaging 0.66 bobwhites harvested per hunting effort.

The Refuge currently provides approximately 1,000 acres of suitable quail habitat, most in scattered, small fragments. Within the 22,472 acre acquisition boundary exists perhaps another 1,000 acres of suitable habitat that could be added to the Refuge over time. Presently, the Refuge gets very few hunters pursuing quail on the small grassland areas. Some of the best quail habitat in Southwest Indiana is on reclaimed coal mined grasslands. Over time, as much of the local reclaimed coal mine ground is reverted to cropland or leased to private hunting parties, the Refuge could see an increased interest in quail hunting use.

In 2011 it was estimated that of 1800 upland game visits to the Refuge, that 50 were for quail hunting. Using the success rate of 0.66 birds harvested per day in the field as calculated by INDNR, it is estimated that 33 quail are harvested on the 8,007 acres under Refuge management in a given year, or 0.15% of the total harvest in Indiana. Opening 691.74 acres to hunting and closing 52 acres to hunting as proposed in the 2012 Hunt Plan will result in an estimated additional 10 quail hunts per year on newly opened Refuge lands per year, resulting in an additional 6.6 quail harvested, or 0.03% of the total harvest in Indiana..

The Refuge has an approved boundary of 22, 472 acres (approximately 35 square miles) that could eventually be owned in fee title or conservation easement ownership. According to the CCP, 2,139 acres of the Refuge will be managed as grassland potentially suitable for bobwhite quail once the Refuge is fully established. It is assumed that all of these acres would be open to

hunting. This would double the amount of quail habitat the Refuge currently manages and would likely double the number of quail hunt days (from 50 to 100 quail hunts per year). Using 0.66 birds harvested per day, one-hundred quail hunts per year would result in a Refuge harvest of 66 quail. Sixty-six quail represent 0.3% of the 21,102 bobwhite quail harvested in Indiana in the 2008-2009 season.

Cottontail Rabbit

According to the Small Game Harvest Survey conducted by INDNR Division of Fish and Wildlife an estimated 69,453 cottontail hunters harvested an estimated 198,701 rabbits in Indiana during the 2008–2009 season, about equal to the number harvested in 2005-2006 . Hunters in southwest Indiana had the greatest success averaging 0.82 cottontails harvested per hunting effort.

The Refuge currently provides approximately 1,000 acres of suitable rabbit habitat, most in scattered, small fragments. Within the 22,472 acre acquisition boundary exists perhaps another 1,000 acres of suitable habitat that could be added to the Refuge over time. In addition to managed grassland/shrublands, Refuge tree plantings provide temporary habitat for rabbits during the first few years after planting. To date the Refuge has planted trees on over 1,000 acres of agricultural fields with the ultimate goal of restoring hardwood forests.

In 2011 it was estimated that of the 1800 upland game visits to the Refuge, that 400 visits were for rabbit hunting. Using the success rate of 0.82 rabbits per day per hunter as described by INDNR, it is estimated that 328 rabbits are harvested on suitable habitat under Refuge management in a given year, or 0.16% of the total harvest for the state. Opening 691.74 acres to hunting and closing 52 acres to hunting as proposed in the 2012 Hunt Plan will result in an estimated additional 50 acres of potential rabbit habitat that could be hunted, an estimated additional 13 rabbit hunt visits per year, and an additional harvest of 11 rabbits or 0.005% of the total harvest for the state

The Refuge has an approved boundary of 22, 472 acres (approximately 35 square miles) that could eventually be owned in fee title or conservation easement ownership. According to the CCP, 2,139 acres of the Refuge will be managed as grassland/shrubland potentially suitable for cottontail rabbit once the Refuge is fully established. It is assumed that all of these acres would be open to hunting. This would double the amount of rabbit habitat the Refuge currently manages and would likely double the number of rabbit hunt days (from 400 to 800 rabbit hunts per year). Using 0.82 rabbits harvested per day, eight-hundred rabbit hunts per year would result in a harvest of 656 rabbits on the Refuge in a year. Six-hundred and fifty six rabbits represent 0.3% of the 198,701 rabbits harvested in Indiana in the 2008-2009 season.

Squirrel (Gray and Fox)

Gray Squirrel

According to the Small Game Harvest Survey conducted by INDNR Division of Fish and

Wildlife an estimated 51,798 gray squirrel hunters harvested an estimated 161,546 gray squirrels in Indiana during the 2008– 2009 season up over 52% from 2005-2006. Hunters in south-central Indiana had the greatest success averaging 0.74 gray squirrels harvested per hunting effort.

The Refuge currently approximately 2,500 acres of mature large stands of hardwoods mostly in the eastern portion of the Refuge in Pike County that would provide ample habitat for the gray squirrel.

In 2011 it was estimated that of 1800 upland game visits to the Refuge, that 100 were for gray squirrel hunting. Using the success rate of 0.74 gray squirrel per day per hunter as described by INDNR, it is estimated that 74 gray squirrels are harvested on suitable habitat under Refuge management each year, or 0.046% of the total harvest for the state. Opening 691.74 acres to hunting and closing 52 acres to hunting as proposed in the 2012 Hunt Plan will result in an estimated additional 600 acres of potential gray squirrel habitat that could be hunted, an estimated additional 7 gray squirrel hunt visits per year, and an additional harvest of 5.5 gray squirrel or 0.003% of the total harvest for the state in the 2008-2009 season.

The Refuge has an approved boundary of 22, 472 acres (approximately 35 square miles) that could eventually be owned in fee title or conservation easement ownership. According to the CCP, 17,997 acres of the Refuge will be managed as forest potentially suitable for gray squirrel once the Refuge is fully established. It is assumed that all of these acres would be open to hunting. This would more than double the amount of potential gray squirrel habitat the Refuge currently manages and would increase the number of gray squirrel hunt days (from 100 to 225 gray squirrel hunts per year). Using 0.74 gray squirrels harvested per day, two-hundred and twenty five gray squirrel hunts per year would result in a harvest of 166.5 gray squirrel on the Refuge in a year. One-hundred and sixty six gray squirrels represent 0.1% of the 161,546 gray squirrels harvested in Indiana in the 2008-2009 season.

Fox Squirrel

According to the Small Game Harvest Survey conducted by INDNR Division of Fish and Wildlife an estimated 76,608 fox squirrel hunters harvested an estimated 315,367 fox squirrels in Indiana during the 2008– 2009 season up over 52% from 2005-2006. Hunters in northwest and southwest Indiana had the greatest success averaging .85 fox squirrels harvested per hunting effort.

The Refuge currently provides a approximately 2,500 acres of fragmented forests interspersed with agricultural fields (both privately and Refuge owned) stands of hardwoods mostly in the western portion of the Refuge in Gibson County that provide suitable habitat for the fox squirrel.

In 2011 it was estimated that of 1800 upland game visits to the Refuge, that 500 were for fox squirrel hunting. Using the success rate of 0.85 fox squirrel per day per hunter as described by INDNR, it is estimated that 425 fox squirrels are harvested on suitable habitat under Refuge management each year, or 0.1% of the total harvest for the state. Opening 691.74 acres to

hunting and closing 52 acres to hunting as proposed in the 2012 Hunt Plan will result in an estimated additional 600 acres of potential fox squirrel habitat that could be hunted, an estimated additional 37 fox squirrel hunt visits per year, and an additional harvest of 31 fox squirrel or 0.01% of the total harvest for the state in the 2008-2009 season.

The Refuge has an approved boundary of 22, 472 acres (approximately 35 square miles) that could eventually be owned in fee title or conservation easement ownership. According to the CCP, 17,997 acres of the Refuge will be managed as forest potentially suitable for fox squirrel once the Refuge is fully established. It is assumed that all of these acres would be open to hunting. This would more than double the amount of potential fox squirrel habitat the Refuge currently manages and would increase the number of gray squirrel hunt days (from 425 to 956 fox squirrel hunts per year). Using 0.85 fox squirrels harvested per day, nine-hundred and fifty-six fox squirrel hunts per year would result in a harvest of 812.6 fox squirrel on the Refuge in a year, or 0.2% of the 315,367 fox squirrels harvested in Indiana in the 2008-2009 season.

Raccoon, Fox (Red and Gray), Coyote, and Opossum

INDNR Division of Fish and Game show stable, huntable populations of these species and have hunting and trapping programs. This alternative would only allow the hunting of these species. The hunting of these species is dependent on the price of pelts in any given year. Weather also plays a part in harvest. DNR estimates for harvest by hunters for the 2008-2009 seasons are shown on Table 2.

Table 2. 2008-2009 State Harvest Estimate for Hunting

Species	**Indiana Harvest**
Raccoon	149,397
Fox (Red and Gray)	2,372 (red) 415 (gray)
Coyote	29,128
Opossum	4,212

Hunting regulations for these species on Patoka River NWR & MA units require a Refuge permit. Available habitat on Refuge units will limit harvest.

In 2011, 19 permits were given out for hunting furbearers on the 8,007 acres under Refuge management. One permit can cover a hunter for multiple species of furbearers. Of these 19 permits, 14 included coyote, 6 included raccoon, 5 included fox, and 0 included opossum. The results of the 2011 harvest reports from hunters indicated the following furbearers were taken on the Refuge: 0 raccoon, 0 fox, 3 coyote (0.01% of the state harvest from 2008-2009), and 0 opossum.

Opening 691.74 acres to hunting and closing 52 acres to hunting as proposed in the 2012 Hunt Plan will result in an estimated additional 1.66 Refuge permits given for hunting furbearers and

could result in an additional harvest of 0 raccoon, 0 fox, 0.26 coyote (0.0009% of the total state harvest in 2008-2009), and 0 opossum.

The Refuge has an approved boundary of 22, 472 acres (approximately 35 square miles) that could eventually be owned in fee title or conservation easement ownership. It is assumed that all of these acres would be open to hunting. Opening the entire Refuge to hunting would result in an estimated 53 furbearer permits issued and could result in an additional harvest of 8.4 coyotes (0.03% of the total state harvest in 2008-2009). Raccoon, fox, and opossum harvest would remain well below 0.1% of the state harvest total.

Non-hunted Resident Wildlife

Non-hunted wildlife would include small mammals such as voles, moles, mice, and shrews; reptiles and amphibians such as snakes, skinks, turtles, lizards, salamanders, frogs and toads; and invertebrates such as butterflies, moths, other insects and spiders. Except for migratory birds and some species of migratory butterflies and moths, these species have very limited home ranges and hunting would not affect their populations regionally.

Some species of butterflies and moths are migratory. Cumulative effects to these species at the "flyway" level should be negligible. Any hunter interaction would be similar to that of non-consumptive users. Disturbance to non-hunted wildlife would increase slightly. However, significant disturbance would be unlikely since small mammals are generally inactive during late November and early December and many of these species are nocturnal. Both of these qualities make hunter interactions with small mammals very rare. Hibernation or torpor by cold-blood reptiles and amphibians also limits their activity when temperatures are low. Hunters would rarely encounter reptiles and amphibians during most of the hunting season. Invertebrates are also not active during cold weather and would have few interactions with hunters during the hunting season. Refuge regulations further mitigate possible disturbance by hunters to nonhunted wildlife. Vehicles are restricted to roads and the harassment or taking of any wildlife other than the game species legal for the season is not permitted.

Migratory Birds

Migratory game birds are those bird species so designated in conventions between the United States and several foreign nations for the protection and management of these birds. Under the Migratory Bird Treaty Act (16 U.S.C.703-712), the Secretary of the Interior is authorized to determine when "hunting, taking, capture, killing, possession, sale, purchase, shipment, transportation, carriage, or export of any ... bird, or any part, nest, or egg" of migratory game birds can take place, and to adopt regulations for this purpose. These regulations are written after giving due regard to "the zones of temperature and to the distribution, abundance, economic value, breeding habits, and times and lines of migratory flight of such birds, and are updated annually (16 U.S.C. 704(a)). This responsibility has been delegated to the U.S. Fish and Wildlife Service as the lead federal agency for managing and conserving migratory birds in the

United States. Acknowledging regional differences in hunting conditions, the Service has administratively divided the nation into four Flyways for the primary purpose of managing migratory game birds. Each Flyway (Atlantic, Mississippi, Central, and Pacific) has a Flyway Council, a formal organization generally composed of one member from each State and Province in that Flyway. Patoka River NWR & MA is located in the Mississippi Flyway.

The process for adopting migratory game bird hunting regulations, located in 50 CFR part 20, is constrained by three primary factors. Legal and administrative considerations dictate how long the rule making process will last. Most importantly, however, the biological cycle of migratory game birds controls the timing of data-gathering activities and thus the dates on which these results are available for consideration and deliberation. The process of adopting migratory game bird hunting regulations includes two separate regulations-development schedules based on "early" and "late" hunting season regulations. Early hunting seasons pertain to all migratory game bird species in Alaska, Hawaii, Puerto Rico, and the Virgin Islands; migratory game birds other than waterfowl (e.g. dove, woodcock, etc.); and special early waterfowl seasons, such as teal or resident Canada geese. Early hunting seasons generally begin prior to October 1. Late hunting seasons generally start on or after October 1 and include most waterfowl seasons not already established. There are basically no differences in the processes for establishing either early or late hunting seasons. For each cycle, Service biologists and others gather, analyze, and interpret biological survey data and provide this information to all those involved in the process through a series of published status reports and presentations to Flyway Councils and other interested parties.

Because the Service is required to take an abundance of migratory birds and other factors in to consideration, the Service undertakes a number of surveys throughout the year in conjunction with the Canadian Wildlife Service, State and Provincial wildlife-management agencies, and others. To determine the appropriate framework for each species, the Service considers factors such as population size and trend, geographical distribution, annual breeding effort, the condition of breeding and wintering habitat, the number of hunters, and the anticipated harvest. After frameworks are established for season lengths, bag limits, and areas for migratory game bird hunting, migratory game bird management becomes a cooperative effort of State and Federal Governments. After Service establishment of final frameworks for hunting seasons, the States may select season dates, bag limits, and other regulatory options for the hunting seasons. States may always be more conservative in their selections than the Federal frameworks but never more liberal. Season dates and bag limits for National Wildlife Refuges open to hunting are never longer or larger than the State regulations. In fact, based upon the findings of an environmental assessment developed when a National Wildlife Refuge opens a new hunting activity, season dates and bag limits may be more restrictive than the State allows. The waterfowl season on Patoka River NWR & MA units will follow the frameworks set in place for Indiana.

Waterfowl

Waterfowl surveys are conducted during the late fall, winter, and early spring seasons. The data

are used to provide managers and the public with current information on the distribution and abundance of waterfowl using the Refuge, and to identify annual trends in waterfowl use of wetlands and impoundments on the Refuge.

During the fall, winter, and spring, the Refuge wetlands support thousands of waterfowl, including Swans, Snow Geese, Canada Geese, Wood Ducks, Northern Pintail, Ring-necked Ducks, Mallards, Gadwall, American Wigeon, Northern Shoveler, Blue-winged Teal, and Green-winged Teal that use the Refuge as a stopover for rest and forage. Waterfowl that use the Refuge for nesting include Canada Goose, Mallard, Wood Duck, and Hooded Merganser.

The peak time for waterfowl use on the Refuge is January through mid-February (see Table 3). Aerial waterfowl surveys conducted in 2011 and 2012 indicated that over 17,000 ducks and geese may be using the Refuge along the Patoka River during this peak season. Over 200,000 ducks, geese, and swans have been documented in the area on February 8th, 2011 at Gibson Lake (Duke Energy), Tern Bar Slough (INDNR), and Cane Ridge (Refuge) (see Table 4). Currently, INDNR has set the South Zone seasons for ducks at November 24th through January 20th and geese at November 24th through January 27th. These dates provide hunting opportunities on the Refuge when waterfowl use is near its height.

Table 3. Aerial Waterfowl Inventory Data for Patoka River NWR & MA 2011 and 2012. Aerial survey below includes the western section of the Patoka River from HWY 41 to HWY 57.

2011								
	1/14/2011	*2/8/2011*	*2/15/2011*	*2/23/2011*				
Total Ducks	3,150	7,300	1,350	1,860				
Total Geese	925	4,350	1,790	425				
Total Ducks/Geese	4,075	11,650	3,140	2,285				
2012								
	1/18/2012	*2/3/2012*	*2/17/2012*	*2/22/2012*	*2/28/2012*	*3/5/2012*	*3/16/2012*	*3/28/2012*
Total Ducks	9,630	15,900	16,040	13,435	12,720	6,690	8,440	2,160
Total Geese	855	1200	855	480	115	75	20	15
Total Ducks/Geese	10,485	17,100	16,895	13,915	12,835	6,765	8,460	2,175

Table 4. Aerial Waterfowl Inventory Data for Patoka River NWR & MA 2011 and 2012. Aerial survey below includes Gibson Lake (Duke Energy), Tern Bar Slough (INDNR), and Cane Ridge Fish and Wildlife Area (FWS, managed by the Refuge).

2011									
	1/14/2011	*2/8/2011*	*2/15/2011*	*2/23/2011*	*3/1/2012*	*3/6/2011*	*3/16/2011*	*3/24/2011*	*4/12/2011*
Total Ducks	56,600	63,000	215	495	320	1,610	150	1,825	150
Total Geese	57,160	148,800	6,380	50	40	110	10	15	0
Total Ducks/Geese	113,760	211,800	6,595	545	360	1,720	160	1,840	150
2012									
	1/18/2012	*1/24/2012*	*2/3/2012*	*2/17/2012*	*2/22/2012*	*2/28/2012*	*3/5/2012*	*3/16/2012*	*3/28/2012*
Total Ducks	22,900	7,855	3,200	7,155	3,205	1,965	2,090	8,440	1,245
Total Geese	132,050	91,230	1,210	86,340	30,205	12,070	15,330	20	50
Total Ducks/Geese	154,950	99,085	4,410	93,495	33,410	14,035	17,420	8,460	1,295

In the July 2011 ***Migratory Bird Hunting Activity and Harvest During the 2010 and 2011 Hunting Seasons*** report, the Service estimates the seasonal duck harvest in Indiana to be 94,100 (2010) and 123,200 (2011) (see Figure 1). Ducks harvested per hunter day afield in Indiana was 1.39 (2010) and 1.45 (2011).

There are 76 days of duck hunting in SW Indiana for 2012 (early Teal season 9/1-9/16, regular duck season 11/3-11/4, 11/24-1/20). An estimated 50 duck hunters use the Refuge each day on the weekend (26 days), while an estimated 15 duck hunters use the Refuge each day during the week (50 days) for a total of 2,050 duck hunt users. Using an average of 1.42 ducks per day afield from the 2010-2011 seasons multiplied by 2,050 duck hunt visits to the Refuge indicates an 2,911 ducks (or 2.36% of the total harvest for the state) may be harvested on the Refuge in a given year.

Opening 691.74 acres to hunting and closing 52 acres to hunting as proposed in the 2012 Hunt Plan will result in an estimated 100 acres of suitable duck hunting opportunities, 26 additional hunt use days, and an additional harvest of 37 ducks, or 0.03% of the total harvest for the state in the 2011 season.

The Refuge has an approved boundary of 22, 472 acres (approximately 35 square miles) that could eventually be owned in fee title or conservation easement ownership. It is assumed that all of these acres would be open to hunting. Under full ownership, the Refuge would provide an estimated 3,075 duck hunter use days per year (about 1.5 times more than the current ownership allows, as the largest and most accessible duck hunting areas are already part of the Refuge). Using 1.42 ducks harvested per day, 3,075 duck hunts per year would result in a harvest of 4,367 ducks harvested on the Refuge in a year, or 3% of the total ducks harvested in Indiana in the 2011 season.

In the July 2011 ***Migratory Bird Hunting Activity and Harvest During the 2010 and 2011 Hunting Seasons*** report, the Service estimates the seasonal goose harvest in Indiana to be 74,800 (2010) and 49,600 (2011) (see Figure 2). Geese harvested per hunter day afield in Indiana was .95 (2010) and .66 (2011).

When compared to duck hunting, it is estimated that about ten percent of the waterfowl visits are specifically for geese. Currently, the Refuge has approximately 205 goose hunt visits per year. Using an average of .81 geese averaged per day afield from the 2010-2011 seasons multiplied by 205 goose hunt visits to the Refuge indicates that 166 geese (or 0.3% of the total harvest for the state in 2011) may be harvested on the Refuge in a given year.

Opening 691.74 acres to hunting and closing 52 acres to hunting as proposed in the 2012 Hunt Plan will result in an estimated 100 acres of suitable goose hunting opportunities, 16 additional hunt use days, and an additional harvest of 13 geese, or 0.02% of the total harvest for the state in the 2011 season.

The Refuge has an approved boundary of 22, 472 acres (approximately 35 square miles) that could eventually be owned in fee title or conservation easement ownership. It is assumed that all of these acres would be open to hunting. Under full ownership, the Refuge would provide an estimated 307.5 goose hunter use days per year (about 1.5 times more than the current ownership allows, as the largest and most accessible goose hunting areas are already part of the Refuge). Using .81 geese harvested per day, 307.5 goose hunts per year would result in a harvest of 249 geese harvested on the Refuge in a year, or 0.5% of the total geese harvested in Indiana in the 2011 season.

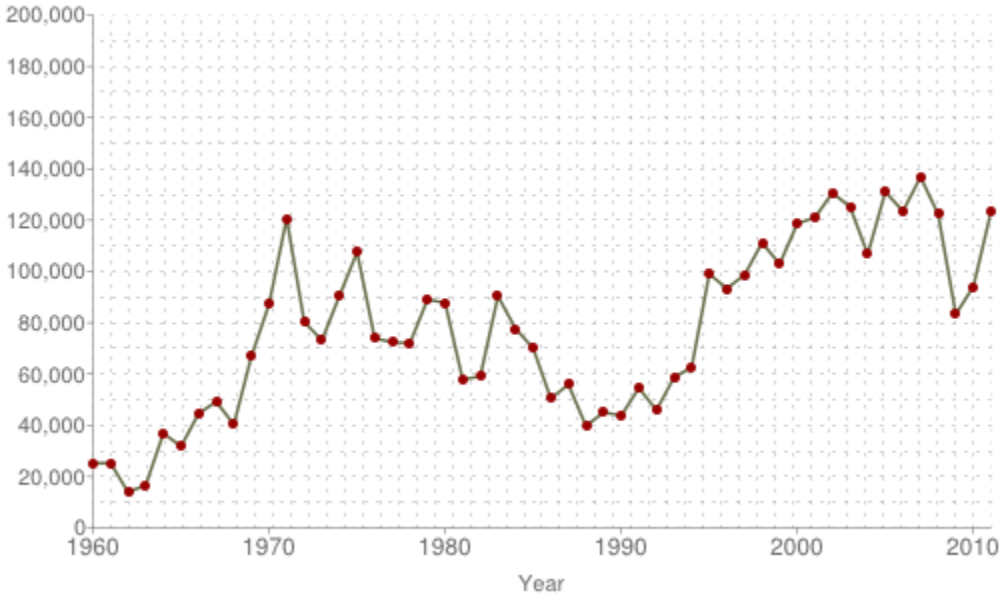

Figure 1. Total Number of Ducks Harvested in Indiana 1960-2011 (USFWS)

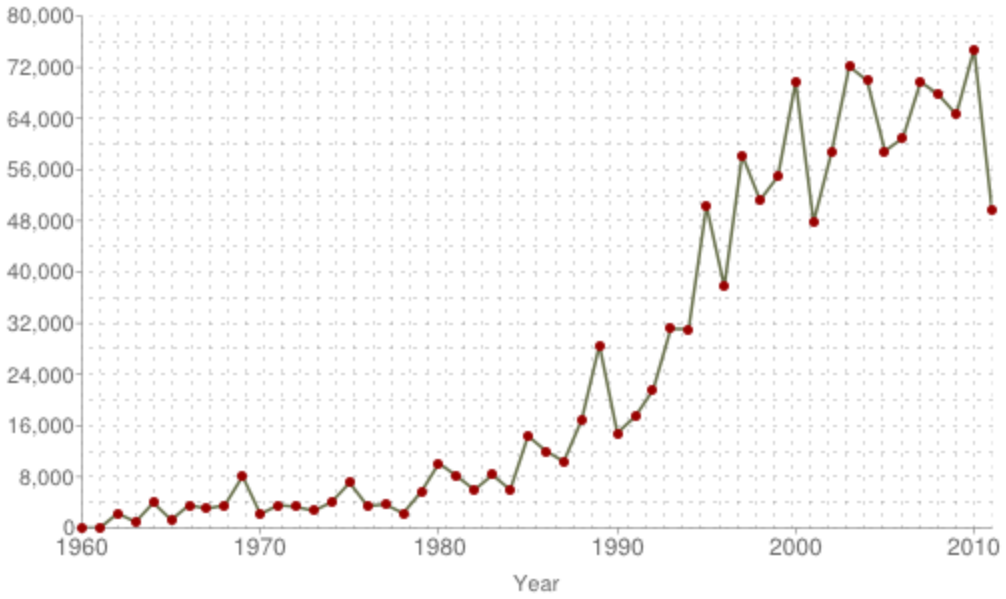

Figure 2. Total Number of Geese Harvested in Indiana 1960-2011 (USFWS)

Mourning Doves

In the July 2011 ***Migratory Bird Hunting Activity and Harvest During the 2010 and 2011 Hunting Seasons*** report, the Service estimates the seasonal mourning dove harvest in Indiana to be 187,700 (2010) and 216,900 (2011). Doves harvested per hunter day afield in Indiana was 6.27 (2010) and 5.74 (2011). In the 2012 RAPP the Refuge had an estimated 50 migratory bird hunt visits for the year (an estimated 40 of these were for doves). Using an average of 6 doves per day afield from the 2010-2011 seasons multiplied by 40 dove hunt visits to the Refuge indicates an estimated 240 doves may have been harvested on the Refuge in a given year, or 0.1% of the total dove harvest for the state.

Opening 691.74 acres to hunting and closing 52 acres to hunting as proposed in the 2012 Hunt Plan will result in an estimated 100 acres of suitable dove hunting opportunities, .5 additional dove hunt use days, and an additional harvest of 3 doves, or 0.001% of the total harvest for the state in the 2011 season.

The Refuge has an approved boundary of 22, 472 acres (approximately 35 square miles) that could eventually be owned in fee title or conservation easement ownership. It is assumed that all of these acres would be open to hunting. Under full ownership, the Refuge would provide an estimated 120 dove hunting use days. Using 6 doves harvested per day, 120 dove hunts per year would result in a harvest of 720 doves harvested on the Refuge in a year, or 0.3% of the total doves harvested in Indiana in the 2011 season.

Woodcock, Snipe, Sora, and Coot

Although these species are all heard and seen on the Refuge, very few hunters attempt to harvest

these species. The Refuge estimates 10 hunt visits per year total for woodcock, snipe, and sora, with an estimated total of 2 woodcock (0.1% of the state harvest total in 2009), 3 snipe (0.5% of state harvest total from 2010), and 3 sora (0.09% of the state harvest total for rails) taken on the Refuge per year. For coot, it is estimated that two percent (or 41 vistits) of the 2,050 waterfowl visits per year are for coot hunting. In the July 2011 Migratory Bird Hunting Activity and Harvest During the 2011 Hunting Seasons report, the Service estimates the seasonal coot harvest to be 1.2 coots harvested per day afield, indicating the harvest on the Refuge is 49 coots per year, or 2.7% of the total harvest for the state.

Opening 691.74 acres to hunting and closing 52 acres to hunting as proposed in the 2012 Hunt Plan will result in a minimal harvest increase of 3/10 of one bird or less for woodcock, snipe, and sora, which amounts to less than one-percent of the harvested total for the state for each species. For coot, an estimated 3.3 additional hunt days would occur and 4 coot would be harvested, or 0.2% of the state harvest total for 2011.

The Refuge has an approved boundary of 22, 472 acres (approximately 35 square miles) that could eventually be owned in fee title or conservation easement ownership. It is assumed that all of these acres would be open to hunting. Under full ownership, the Refuge would provide an estimated 30 woodcock, snipe, and/or sora hunt days total. When the entire acreage is managed by the Service an estimated 6 woodcock (0.3% of the state harvest), 9 snipe (2% of the state harvest), and 9 sora (0.2% of the state harvest) may be taken on the Refuge in a given year. For coot, an estimated 115 total coot hunt days would occur and 138 coot would be harvested, or 7.6% of the state harvest total for 2011.

4.3.5.B Anticipated Direct and Indirect Impact of Proposed Hunting on Refuge Programs, Facilities, and Cultural Resources

Other Refuge Wildlife-Dependent Recreation

Approximately 23,500 visitors used Refuge lands in 2012. In addition to hunting (10,450 vistits) which made up the majority of visits, the Refuge had 5,100 fishing visits and 8,235 wildlife observation, photography, and environmental education, interpretation visits combined.

The majority of the fishing, wildlife observation, environmental education, and interpretation activities occur in the spring, summer and early fall. Due to this seasonality, conflicts with hunting are expected to be minimal. Although fishing takes place year round on the Refuge, conflict with other uses should be minimal because of the nature of the use. Varied public uses have taken place on the Refuge since 1996 and conflicts between hunters and non-hunters such as wildlife observation, environmental education and interpretation have been minimal.

This alternative will give the public the opportunity to participate in another wildlife-oriented recreation that is compatible with the purposes for which the Refuge was established and have an increased awareness of the Patoka River NWR & MA and the National Wildlife Refuge System. The Service will be meeting public use demand and public relations will be enhanced with the local communities.

Refuge Facilities
Few, if any, additional impacts to Refuge facilities (roads, parking lots, and trails) will occur with this alternative. Refuge facilities will receive an increase in use with the addition of consumptive visitors, but the impacts would be minimal. Any maintenance or improvement of existing roads and parking areas will cause minimal short term impacts to localized soils and may cause some temporary wildlife disturbance.

Physical developments to accommodate the public's use and enjoyment of these Refuge lands will generally be limited to small parking areas, informational and educational signs, and access roads. On some units, short hiking trails and wildlife observation areas may be developed. Disturbance by vehicles will be limited to existing parking areas. Special access accommodations for persons with disabilities could be allowed. These accommodations will be made on a case by case basis by the Refuge manager.

Cultural Resources
This alternative will not have any additional impacts to cultural resources. Hunting activities will result in no ground disturbance or disturbance to standing structures and would have no effect on any historic properties.

4.3.5.C Anticipated Direct and Indirect Impact of Proposed Hunting on Refuge Environment and Community

Refuge personnel expect no measurable adverse impacts by this proposed action on the Refuge environment which includes soils, vegetation, air quality, water quality and solitude. Some disturbance to surface soils and vegetation would occur in some areas, however these disturbances would be minimal. Access would also be controlled to minimize habitat degradation.

The Service owns and administers numerous National Wildlife Refuges that are distributed throughout the country. All Refuge lands are part of the NWR System and the Service's primary purpose for these lands is to ensure the preservation of migratory birds, threatened and endangered species, and resident wildlife. An additional primary purpose established by the Service for these lands is to provide opportunities for the public to hunt, fish, observe and photograph wildlife, and increase public understanding and appreciation of the different ecosystems.

As a result of this alternative, expenditures by visitors for meals, lodging and transportation would increase in the communities where these Refuge lands are located. According to the 2011 National Survey of Fishing, Hunting, and Wildlife Associated Recreation, hunting and fishing expenditures in Indiana totaled $1.02 billion. Also in 2011, $752 million was spent on non-consumptive recreational activities in Indiana. Municipalities and community organizations could bring additional tourism revenues into their economies by establishing partnerships with the Service to develop and promote the recreational opportunities that are available on the

Refuge lands surrounding their communities.

Impacts of the Proposed Action on the Refuge physical environment would have minimal to negligible effects to surface soils, topography, and vegetation that occur in areas opened to hunting. Newly acquired acreage would be utilized more by the public (hunters) than had been previously and might cause increased trampling of vegetation, however the impacts should be minor. Refuge regulations do not permit the use of vehicles off of designated Refuge roads. Vehicles for hunters with disabilities would be confined to existing roads and parking lots.

Hunting would benefit vegetation as it is used to keep resident deer populations in balance with the carrying capacity of the habitat.

Impacts to the natural hydrology would be negligible. The Refuge staff expects impacts to air and water quality to be minimal and only due to Refuge visitor's use of automobiles on adjacent township and county public roads. The effect of these Refuge-related activities on overall air and water quality in the region are anticipated to be negligible.

Impacts associated with solitude are expected to be minimal given the limited time, season, and space management techniques used to avoid conflicts among user groups.

Public hunting on the Refuge should not adversely impact the soils, vegetation, air and water quality, solitude, or the Service's management activities for the Refuge lands. The establishment of a hunting program for the Refuge could positively impact the local economy by drawing visitors to the area who would likely spend money in the community.

The Preferred Alternative would have similar minimal to negligible effects on human health and safety.

There is a potential to have some minimal disturbance on the general public, nearby residents, and Refuge visitors. The disturbance factor is considered minimal, as hunting has occurred on the Refuge since 1996, as well as thousands of acres of state properties and private property in southwest Indiana. It is possible that Refuge hunting will increase hunting opportunities on surrounding lands, by increasing the wildlife moving beyond the boundary of the individual Refuge units.

4.3.5.D Other Past, Present, Proposed, and Reasonably Foreseeable Hunting Activities and Anticipated Impacts

Hunting has been allowed on Patoka River NWR & MA since the first Hunting and Fishing Plan was approved and registered in the Code of Federal Regulations in 1996. If public use levels expand in the future, unanticipated conflicts between user groups may occur. Service experience has proven that time and space zoning can be an effective tool in eliminating conflicts between user groups. On a case by case basis, the Refuge Manager will determine if such a tool is necessary to limit conflicts.

4.3.5.E Anticipated Impacts If Individual Hunts Are Allowed To Accumulate

National Wildlife Refuges, including Patoka River NWR & MA, conduct or will conduct hunting programs within the framework of State and Federal regulations. The Preferred Alternative is at least as restrictive as the State of Indiana and in some cases, the hunts will be more restrictive. By maintaining hunting regulations that are as, or more, restrictive than the State, individual Refuges ensure that they are maintaining seasons which are supportive of management on a regional basis.

The final EIS was reviewed by and the selected alternative supported by the Indiana Department of Natural Resources (INDNR) stated that hunting would be permitted on most fee title units of the Refuge. Additionally, the Refuge coordinates with the INDNR annually to maintain regulations and programs that are consistent with the States' management program.
The hunting of big game, upland/small game, and migratory bird game species will have minimal impacts to local, regional, state, and flyway populations. The majority of these lands were open to hunting before being acquired by the Service. Refuge personnel expect there will be a slight increase in the number animals harvested on Refuge lands as when these lands were in private ownership. Refuge personnel expect and witness that most hunters respect spacing needs between hunters and blinds and will essentially regulate themselves. User conflicts might occur between non-consumptive users and hunters. This not expected, as hunting seasons take place when most non-consumptive uses (wildlife observation, photography) have become minimal, after early October.

4.3.6. Environmental Justice

Executive Order 12898 "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" was signed by President Bill Clinton on February 11, 1994, to focus federal attention on the environmental and human health conditions of minority and low-income populations with the goal of achieving environmental protection for all communities. The Order directed federal agencies to develop environmental justice strategies to aid in identifying and addressing disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations. The Order is also intended to promote nondiscrimination in federal programs substantially affecting human health and the environment, and to provide minority and low-income communities' access to public information and participation in matters relating to human health or the environment. This assessment has not identified any adverse or beneficial effects for either alternative unique to minority or low-income populations in the affected area. None of the alternatives will disproportionately place any adverse environmental, economic, social, nor health impacts on minority or low-income populations.

Table 3. Summary of Environmental Consequences by Alternative

Effect	Alternative A (No Action Alternative) No Hunting on Refuge Units	Alternative B (Preferred Alternative) Allow Hunting on Most Refuge Units	Alternative C Allow Hunting on All Refuge Units
Habitat	Possible depredation of native vegetation and cropland	Minimal Effect	Minimal Effect
Biological	Deer and geese populations remain high and may cause some depredation. Migratory game birds and upland wildlife populations would benefit from not being hunted	Some disturbance of migratory birds, upland/small game, and big game species.	Some disturbance of migratory birds, upland/small game, and big game species.
Listed Species	No Effect	No Effect	No Effect
Historic and Cultural Resources	No Effect	No Effect	No Effect
Cumulative Impacts	Public use conflicts minimized. Deer viewing opportunity increased.	Same as hunting on all other NWRs	Same as hunting on all other NWRs, potential conflict with non-consumptive users
Environmental Justice	Does not provide for priority uses listed in Acts or Refuge establishment EIS. Hunting provided on surrounding state and federal property	Hunt authorized by Migratory Bird Conservation Act, Refuge Recreation Act, NWR Admin Act, and NWR Improvement Act. Listed in Refuge establishment EIS as public use goals.	Hunt authorized by Migratory Bird Conservation Act, Refuge Recreation Act, NWR Admin Act, and NWR Improvement Act. Listed in Refuge establishment EIS as public use goals.

CHAPTER 5. REGULATORY COMPLIANCE

The Refuge Recreation Act of 1962 (16 U.S.C 460k) authorizes the Secretary of the Interior to administer National Wildlife Refuges for public recreation as an appropriate incidental or secondary use (1) to the extent that is practicable and consistent with the primary objectives for which an area was established, and (2) provided that funds are available for the development, operation, and maintenance of permitted recreation. The National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 688dd-ee) authorizes the Secretary of the Interior to permit the use of any area within the NWR System for any purpose, including but not limited to hunting, fishing, and public recreation whenever those uses are determined to be compatible with the purposes for which the area was established. The Improvement Act of 1997 is the latest amendment to the NWR System Administration Act. It supports the NWR System Administration Act's language concerning the authorization of hunting and other recreational uses on Refuge lands. The NWR Improvement Act substantiates the need for the NWR System to focus first and foremost on the conservation of fish, wildlife, and plant resources and their habitats and states that other uses will only be authorized if they are determined to be compatible with this mission statement and the purposes for which the Refuge was established.

Patoka River NWR & MA was established under the authority of the Emergency Wetlands Resources Act of 1986 and its purpose is to provide for the development, advancement, management, conservation, and protection of fish and wildlife resources. The 1994 Final EIS developed for the establishment of the Refuge identified providing compatible wildlife-dependent recreational public uses, such as hunting, fishing, wildlife observation and photography, environmental education and interpretation as being a primary goal for the Refuge. This EIS states that hunting will be permitted on most Units of the Refuge in accordance with federal regulations, refuge regulations, and state seasons. Additionally, hunting was identified in the 2008 Interim Comprehensive Conservation Plan (CCP) that was developed for the Refuge as being a priority public uses that would be authorized on most Units of the Refuge. The Service has determined (i.e., Compatibility Determination included with the 2008 CCP) that these uses are compatible with the purpose of the Refuge and the mission statement of the NWR System. Annual changes to the hunting program will be included in the Hunt Plan and updated in the Code of Federal Regulations.

CHAPTER 6. CONSULTATION AND COORDINATION WITH OTHERS

Indiana Department of Natural Resources, Division of Fish and Wildlife, was contacted and we expect concurrence for these proposed regulated hunting activities associated with Patoka River NWR & MA. Letters of Concurrence have been requested for the proposed 2012 Hunt Plan. The Fish and Wildlife Service also provided an in-depth review by the Regional Office personnel and

staff biologists. Numerous contacts were made throughout the area of the refuge soliciting comments, views, and ideas into the development of the accompanying Hunt Plan.

CHAPTER 7. PUBLIC COMMENT ON DRAFT EA AND RESPONSE

No responses or comments were received during the comment period.

CHAPTER 8. REFERENECES

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